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JUNE 1999

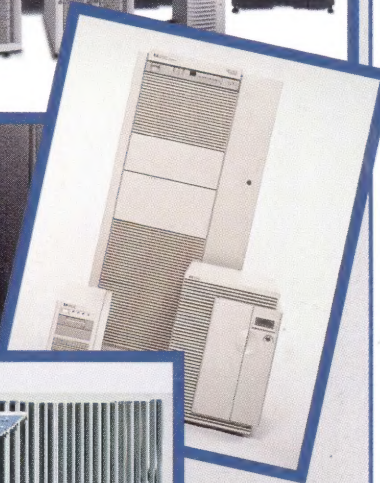
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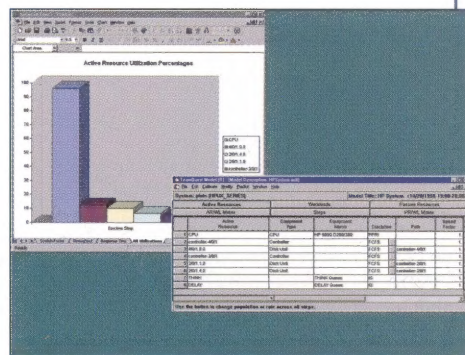
New Column Debut

Enterprise Storage Supplement

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Product Watch

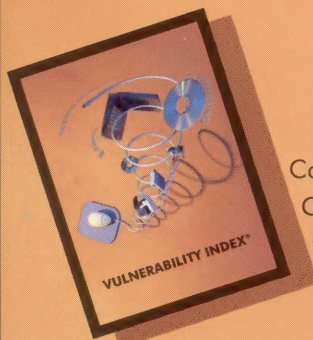
- ◆ Uniscape Global C 3.0
- ◆ TeamQuest Model 7.1



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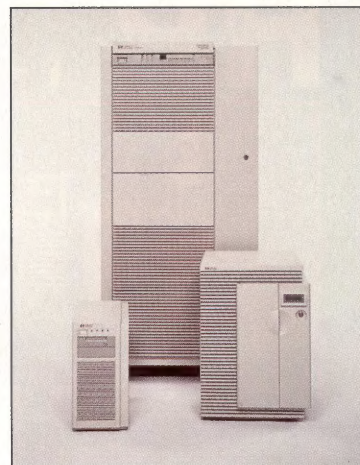
MANAGING TECHNOLOGY IN THE FACE OF CHANGE

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HP Professional

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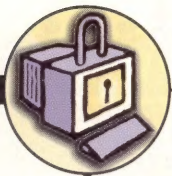
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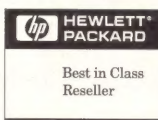
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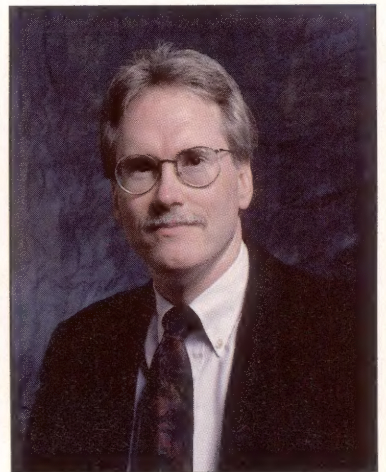
Late Bloomers Show Flower Power

"We feel like we are halfway to the moon and [HP] is trying to gas up the rocket ship. Welcome to the Internet Age, HP – five years late!"

That's the kind of glib remark that you can expect from a marketing exec at Sun Microsystems. Indeed, Anil Garde, "a Sun vice president of marketing" was quoted as above by Peter Burrows in the May 31, 1999 issue of *Business Week*.

Doesn't Mr. Garde know (doesn't everyone?) that being late to the table in the technology game can actually be an advantage? Gateway was late into the direct-to-market PC box game, but that didn't keep Ted Waite and company from accumulating \$8 billion. That's despite having their online corporate pocket picked by Dell. And of course, Bill Gates, himself miscalculated the impact of the Internet on Microsoft's bottom line. But that didn't stop the Microserfs from (finally) creating a good Web browser. Internet Explorer 5.0 is a case study in a product (not even a good one in its original form) brought late to market.

And on the OS front, how about that Linux? By all accounts, it's kicking the snot out of Windows NT. Although Linux has been around for awhile, it's a "late entrant" in commercial form. And with recent interest from Compaq, Dell, HP and IBM, the big money can't be far behind.



THE NET'S ESPERANTO?

Last month, HP finally took the wraps off its E-services strategy, including its paradigm-busting, E-speak technology (aka "Freemont"). E-speak, according to HP-speak, will "serve as the universal language of E-services." Rajiv Gupta, general manager of HP's Open Services Operations, says that "E-speak inserts an electronic mediator to bid, broker and build the right set of resources or services to complete a particular request. Instead of a user having to go to a Web site to conduct all transactions, this approach enables "The Net" to come to users and work on their behalf to get tasks done."

And speaking of everything "E," this month HP has finally launched its very first online shopping Web site — HP Business Store — for small-and medium-sized businesses (www.bstore.hp.com) that want to buy HP products online. Later this year, HP's enterprise customers will be brought into the E-loop. It's all part of HP's new "All Channels, All the Time," strategy (see my interview with Vikram Metha in the April issue) that promises that "whoever you are, whatever you want to buy and however you want to buy it, we pledge to meet your expectations."

So, HP's betting that it's way early in the e-everything phenomenon. Granted, stocks of Internet companies are selling at stratospheric P/E multiples — but halfway to the moon? Apollo 13 was halfway to the moon. Now we call it a "successful failure." How many of today's dot-com shooting stars, accelerating more on promise than profits, will be able to say that of in another five years? Ten years? Better late than never, I always say.

A handwritten signature in black ink, reading "George A. Thompson".

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Inside IT

A New SAN-Script For HP?

HP/Hitachi OEM Agreement Disagrees With EMC

HP wants to move to the forefront of the enterprise and Storage Area Network (SAN) market.

And it sees Hitachi as its ticket to the top. In what many analysts are calling a "major risk" and a "bold action," HP has signed OEM and joint technology agreements with Hitachi, Ltd. (Tokyo, Japan) and its global marketing organization Hitachi Data Systems (Santa Clara, Calif.) aimed at developing, marketing and supporting enterprise-storage subsystems with the Hewlett-Packard moniker.

With the advancement

of Web-based and OLTP applications, storage is quickly accounting for as much as 50% of an enterprise's IT budget. And it's a market that, until now, HP has been content with an indirect approach to, being satisfied to market its servers as neutral platforms that will interconnect with most third-party storage providers.

BIG-PACT ATTACK

The HP-Hitachi pact then would seem to undercut HP's long, and (by most accounts) profitable, reseller relationship with storage system manufacturer EMC, which it is estimated, accounts for more than 50% of HP's storage

system revenues. From EMC's viewpoint, the OEM agreement with Hitachi is more about profit and account control than offering a superior product.

"HP wanted to sign an OEM agreement with EMC and we consistently refused," says Rick Lacroix, EMC's public relations program manager. "The agreement meant putting the HP name on the system and allowing HP to service the system. This [HP's Hitachi pact] is not a relationship based on product. It's much more based on profit and account control. When you have your name on the box and you're selling a

HP storage system, there's more you can do on pricing because you're not going in with another company. And you're also servicing the system for another revenue stream."

BEST OF BREED

So, is HP's agreement with Hitachi going to provide less-than-best-of-breed products? Not to worry, says David Hill, an analyst with the Aberdeen Group (Boston, Mass.). Hill explains that EMC's superior performance and ease of connectivity to multiple computer platforms allowed it to dominate the mid-range server market share. "They brought mainframe characteristics

to UNIX at the high level, which is the most profitable space."

But he adds that Hitachi, with its very strong talent for imitation, has more than caught up with EMC's performance and connectivity over the last several years. Hitachi's problem, according to Hill, was, "they didn't know how to sell in the open systems market." Thus, the OEM agreement with HP.

Another area of strength that EMC emphasizes as a major difference is the storage management software that has long been an important part of the EMC message. "While Hitachi is very good on the hardware side, they haven't been able to catch us in software," says Gil Press, EMC's director of corporate communications. "Software for disaster recovery, online backup, load balancing, for security and so on."

But Hitachi's software shortcomings are not an issue, says Hill, because management software is also a HP strength. In a report entitled, "HP Enterprise Storage Business Unit: Bravely Betting its Future on Open Storage Area Networks," Hill did a head-to-head comparison of functions such as: remote mirroring; point-in-time copy; limiting access to storage volumes in SAN-only environments; remote monitoring, diagnosis and repair facilities; and SAN-device monitoring.

"Comparable functionality, but HP may have more flexible failover capability." "An EMC specialist must set up the copy volumes." "Both support multi-vendor ... HP also supports IBM AIX." "HP can see every device on the SAN. EMC cannot."

The report summarizes, except in some very specific situations, EMC has no demonstrated software superiority over HP. In fact, HP has a slight edge in ease-of-use and breadth of coverage in most cases.

"Besides," adds Hill, "after remote monitoring and mirroring, nothing else is that important."

SALES VOLATILITY

Another area of contention that has long simmered just below the surface of HP's relationship with EMC is a difference of corporate cultures and marketing philosophy. In his analysis of the relationship, Hill says that EMC sales reps are trained to aggressively pursue and win every possible dollar, while HP wants its accounts to view its sales reps as trusted advisors.

This schism has led to increasing field tensions and may have ultimately driven HP to Hitachi.

"That's HP talking because they couldn't get what they wanted out of EMC," says Lacroix. "In many direct sales situa-

tions, there was some channel conflict as EMC tended to want to move a little bit more quickly than HP. I don't believe there's a deep-seated customer or business partner aversion

Hitachi, with its very strong talent for imitation, has more than caught up with EMC's performance and connectivity over the past several years. Hitachi's problem was, "they didn't know how to sell in the open systems market."

to EMC."

All other considerations aside, what may finally be driving HP's apparent willingness to ultimately abandon EMC in favor of Hitachi is its continued drive towards open storage systems and EMC's wavering on the subject. In his report, Hill summarizes that feeling, "... HP and its customers sense that EMC is really building the Proprietary Roach Hotel. Once you go in, you never come out. EMC will push all storage to be on its Symetrix product line and ... aggressively discourage the use of competitors' products."

LOOKING FORWARD

Press says that the historical closeness of the HP/EMC relationship is not apt to change anytime soon and several of the offshoots of that relationship will keep EMC at the forefront of HP's enterprise storage market. "We're still part of their five nines, five minutes program. We're part of their mission critical computing suites

program and a number of their other high-availability programs. And we'll continue to be part of that just as the reseller relationship between HP and EMC remains in place. Where the Hitachi qualification is, I don't know."

But, in the next breath Lacroix says, "We think the landscape in the IT environment has changed from server companies to more of the SIs and the VARs. Rather than turning to a single server company, they seem to be turning to ... whoever can select and install a pretested solution."

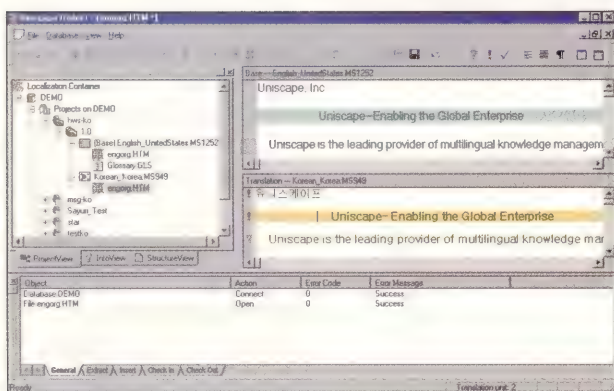
WHAT? ME WORRIED?

Hill's bottom line: "HP's challenge will be to instill in its field sales and support organizations the knowledge, expertise and confidence to establish a truly customer-focused storage systems business division." And finally, "There's a new storage systems player in town. EMC should be concerned — very concerned."

Summing up EMC's position, Lacroix adds, "We're going to continue our penetration of the HP server market with or without HP. Our storage solution is the overwhelming preferred solution for HP users, especially the high-end customers who are doing mission-critical applications. The customer selected EMC. None of it was a packaged deal."

— Ken Deats
Associate Editor

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When Los Gatos, Calif.-based data warehousing company, Red Brick Systems Inc., decided to release its flagship product, Red Brick Warehouse, to the global market in 1995, it had a crucial decision to make.

"There's always this 'Do you buy it or build it?' conflict in software development," says Dr. Walter Wilson, then Red Brick's director of core systems technology. "We had to decide if we wanted to write our own routines or have someone do this for us."

Dr. Wilson decided the build-it option was unfeasible and subsequently selected Uniscape, Inc.'s Global C as the tool it would use to implement the process of globalization.

"It's a relatively complete internationalization/localiza-

tion library," says Dr. Wilson, who now serves as the director of Red Brick Warehouse's kernel and communications engineering. "The value of Global C is that we can focus on what we do well as a data warehouse technology company ... and [Uniscape and Global C] have been able to do their thing."

Uniscape's "thing" is providing the tools and expertise that make it possible for companies to take their products to an international market. Global C is a run-time library that contains multiple-platform APIs and operates from a single code base.

The unique configuration of Global C's library allows software developers to write single-source applications that support multiple languages and run on multiple platforms simultaneously.

Global C differs from traditional globalization solutions, which involve the maintenance of a separate code base for each language and platform supported. Although acceptable for products that operate on a single operating system and in a single language, they become impractical for network products that operate on multiple platforms and support multiple languages.

Using Global C, a com-


pany only needs to create a single generic code base to support all of the relevant languages and platforms. Because of its generic nature, new languages or platforms can be supported without creating new code bases or adjusting an existing code base.

A second benefit is its accounting for cultural conventions, such as currency, time and date formatting and numeric groupings governed as much by territory as by language. Global C supports 54 territorial designations, including all the major countries of Europe and Asia.

Last, Global C makes it faster for a company to open new markets by allowing for new languages, platforms and international issues, such as the release of the Euro, with only minor changes to the established code base.

Dr. Wilson reports that his company has had few performance issues with Global C, although he would like to see it provide more dynamic access to linguistic definitions during parallel processing. "But this is only a problem in high-stress, high-capacity situations."

*Jeff Dodd,
Contributing Author*

A black and white photograph of a hand holding a champagne glass, with a white circular backdrop behind it. The background is a dimly lit party scene with people and balloons.

Everything was great. Then you got promoted.

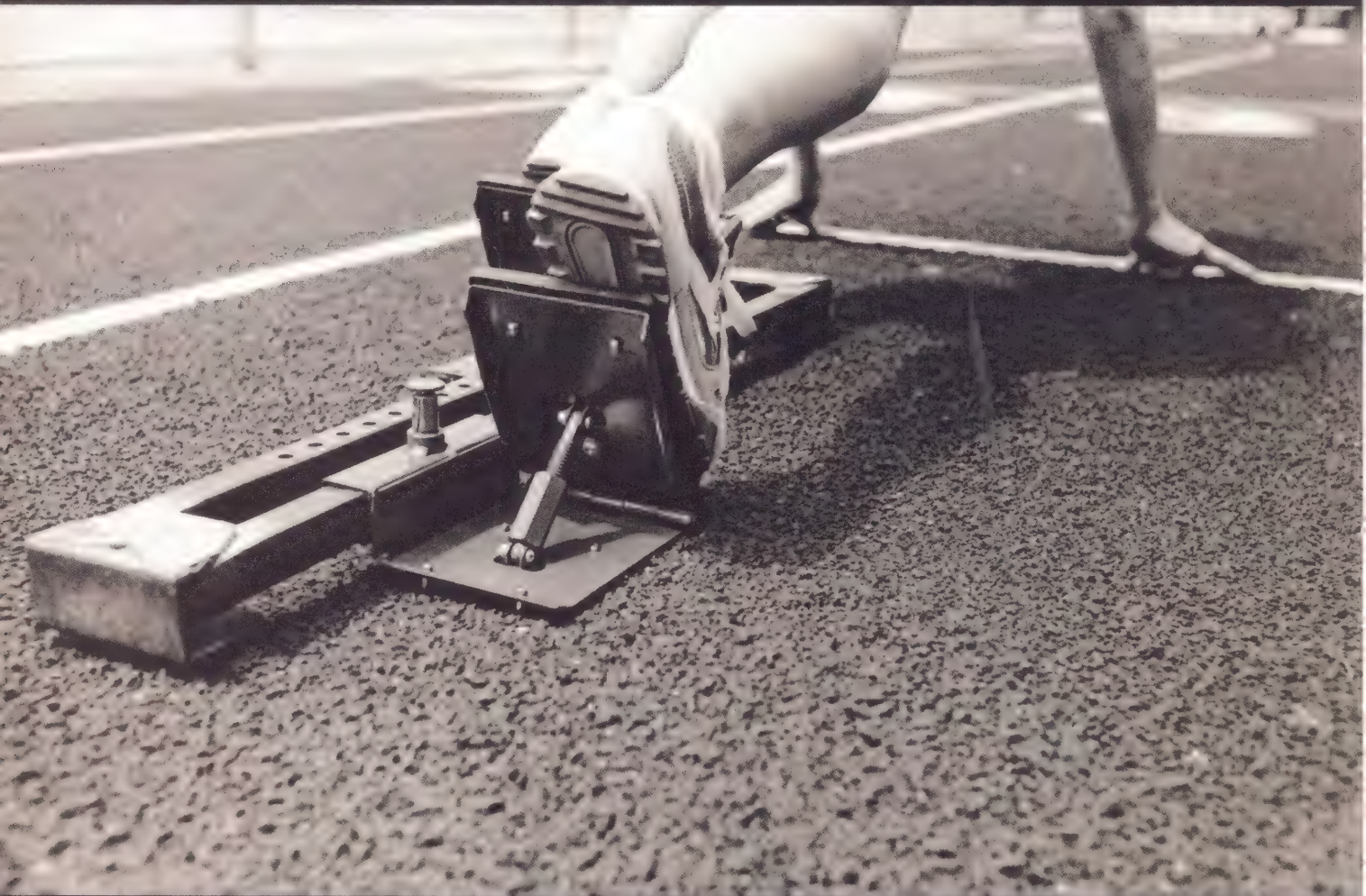
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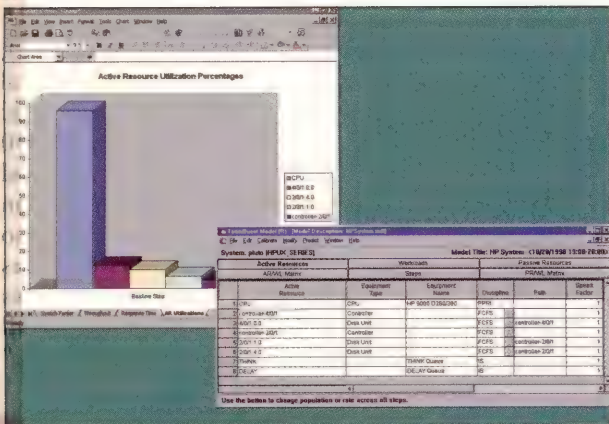
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Most HP-UX managers are familiar with HP OpenView's MeasureWare, which provides base-level performance monitoring in distributed HP-UX environments. For those who need to go beyond its relatively limited capacity management and planning functionality, TeamQuest Corp.'s (Clear Lake, Iowa) TeamQuest Model for MeasureWare 7.1 comes close to scoring a perfect 10.

TeamQuest Model is a predictive tool that helps HP-UX administrators understand the performance characteristics of their present environment while at the same time prepare for future capacity requirements, says Craig Olson, TeamQuest Model product manager.

"It allows you to take

historical information about the performance of your systems and be able to forecast into the future to see what's going to happen to your capacity and to your resource utilization over time."

Rather than modeling an existing system's performance based on a set of predetermined metrics, TeamQuest Model for MeasureWare functions by automatically building and calibrating a real-world analytical model of the relationships that exist between workload elements and system resources. "For example, they'll choose what an average or above-average workload looks like and evaluate their systems based on existing or anticipated real-world conditions."

TeamQuest Model can break down capacity and performance analyses in accordance with the stratification of business units — or "application groups" in the parlance of HP's MeasureWare. HP-UX administrators can then use TeamQuest Model to compare capacity and performance of one department against another and determine where improvements are needed.

According to Olson, existing performance and capacity management prod-

ucts don't provide a level of granularity comparable to TeamQuest Model. "Using a standard performance measurement tool, you can see that your CPU is busy and your response time is such and such, but you generally can't drill down to actually see what percentage of your response time delay is being caused by CPU or I/O problems," he explains.

Terry Hays, a performance consultant in HP's Cupertino, Calif.-based capacity planning center, uses TeamQuest Model to test and model HP-UX systems for prospective HP customers. He claims that TeamQuest Model's aggregate functionality is unmatched by tools from either HP or other third-party vendors.

"There are modeling tools out there, but the power that we see with TeamQuest is the detail of its outbound performance information."

Aggregate functionality aside, Hays says "TeamQuest Model [has the] ability to generate the output very, very easily. [It can be directed] to Microsoft Excel, so if you want to create a graphical report, it's that much easier."

Steve Swoyer,
Contributing Author

When HP's chief marketing guru tells you that HP is going to take HP-UX and make it look like MVS you have to sit up and take notice. Also, if you've been paying attention, the "D-word" — data center — has appeared in much of HP's marketing lately. So, even if you're a loyal HP shop, you also have to ask, "Can HP with the HP 9000 be as successful as IBM and MVS in the data center?"

On paper, the HP 9000's vital statistics look pretty darn good. The HP 9000 product line (see page 34) certainly covers a wide range, as HP advertises scalability, availability and reliability. At the high-end, HP's V-class servers — the V2200 and V2500 — have already made inroads into the data centers of the Global 1000. "The V2500 is meeting its commitment to double the high-end performance every year or so," says James Rinaldi, senior vice president of IR Operations & Services for Marriott International, Inc. Since the V-class was first

launched (in May 1997), HP claims more than 1,500 V-class systems have been shipped to customers. Jonathan Eunice, IT analyst at Illuminata, Inc. (Nashua, N.H.) says that the V2500, announced in December 1998, is putting HP's "big enterprise servers on a positive roll."

DATA DROMEDARY

But is this a case of the camel's nose under the data center tent? Or just a few over-advertised exceptions? According to at least one industry survey, the HP 9000 servers continue to be the mainframe off-load platform of

choice. And at the end of the day, HP claims 5,000 mainframe alternative installations. Skeptics will scoff, but there's growing evidence that HP is right on ... well, the nose.

At Barber-Colman (Rockfield, Ill.), a subsidiary of environmental control manufacturer Siebe Environmental Controls, a 4-way HP 9000 T500 (running HP's Allbase/SQL) replaced a Unisys A-class system. Tom Crowley, Barber-Colman's CIO also uses a variety of other HP servers including HP's midrange K-class servers. "We are close to having all HP hardware and operating systems."



"We are going to take HP-UX and make it look like MVS."

— Nick Earle
Vice-President and Director
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And Bob Warner, manager of Retail Information Systems at Bridgestone, Firestone, Inc. (Nashville, Tenn.), says that, "For the last five years, we have been very pleased with our HP 9000 Enterprise Business Servers."

At Cisco Systems (San Jose, Calif.), HP K-class servers handle all Web user traffic for an Arriba ORMS

application while acting as a backend Oracle ERP database. "With over 50 concurrent users, the load on [the] K-class server is negligible," says Rob Parrott, manager of core technology systems at Cisco. "Over time, we have the capability to add CPU and memory to support more than 1,000 concurrent users, maintaining the

same great performance."

Other companies using a variety of HP servers include:

- Alliant Food Service, Inc. (Deerfield, Ill.), a \$5 billion broadline food distributor uses HP's T500 server for data warehousing.
- DHL Worldwide Express (Redwood City, Calif.), the 24x7 delivery service uses HP T- and K-class servers for its global tracking application.
- Applied Extrusion Technologies, Inc. (AET; Peabody, Mass.) financials and ERP applications are run on HP 3000 systems, while on the shop floor a data capture and product tracking application, developed in-house, is also centralized and runs on HP 9000 computers. HP NetServers are also used as departmental servers.
- The Keebler Company (Elmhurst, Ill.) uses a variety of HP servers to run SAP R/3 in a supply chain application.
- Sara Lee Hosiery (Winston, N.C.) has a T-class running SAP R/3 on top of an Oracle database for data warehousing.

THE BE ALL AND "N" ALL

Over the past year, according to an Aberdeen Group (Boston, Mass.) report, "HP has created a very strong new value proposition for enterprise customers — the V-[class] to run the data center, and compatible N-[class] to run departmental applications." The HP 9000 N-class systems, introduced in mid-April 1999 (and generally available in May) are the newest and most important servers in the HP 9000 pantheon.

According to Aberdeen's analysis, the V- (replacing the T-class) and the N-class platforms represent not only the highest performance in its class, but the beginning of a new product generation. And when combined with HP-UX and compatible middleware, "it can be considered the industry's most highly-available, flexible, scalable and manageable infrastructure for IS professionals to deploy, operate, maintain and upgrade applications." However, the Aberdeen report also notes that the N-class was introduced "one to two quarters later than many users had wished."

"The K-class server was getting

LIES, DAMN LIES AND PERCEPTIONS

"The most damning theory is that [HP] as an organization simply doesn't have the genes for rapid assimilation and adaptation. It is collaborative and distributed, consensus-driven and quality-driven, stable and prestigious." So says Illuminata analyst, Jonathon Eunice's in report "Lew's Platter Shatters."

"I've been a skeptic for the past four years or so," says Eunice. "HP was incredibly complacent and self-satisfied. They missed on the Internet and NT. They should have asked 'Why is Dell growing so fast? Why are our competitors faster to the e-business mark?'" Now, with a flurry of HP announcements and initiatives announced the past few months, Eunice sees HP showing the ability to re-trench and re-tool and he has changed his tune. Besides being among the analysts feeling confident about HP's new servers, Eunice's optimism is inspired by other areas in which HP has been working:

STORAGE

It's no secret that HP wants to take on EMC as leader in the enterprise storage market and Eunice characterizes its recent acquisition of Transoft Networks (Santa Clara, Calif.) as "a brilliant asset." Transoft has long been a leading provider of Fibre Channel SANs for Windows NT and UNIX clustered servers and workstations. "They're the smartest guys about SANs I've met."

FINANCING

Eunice is enthusiastic about new financing options at HP as well. "They're changing the mode in the ways people pay — a utility computing model. They're not just selling gears and boxes as a capital investment. It's more like a utility bill where you're billed on a per usage basis."

E-SERVICES

Eunice says to look at HP's recently announced collaborations with proven industry leaders such as BEA and BroadVision to prove its new commitments to moving to the forefront of Internet-enabled computing. "Don't be blinded by the [E-services] marketing architecture. Look at [HP's] implementation."

"Awesomely good" is how Eunice describes what he's been hearing from Palo Alto since his report first appeared. "They've admitted their mistakes and they're moving fast again."

— Ken Deats, Associate Editor

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HP 3000 SERVER PRODUCT LINE

Model (2)	918LX/RX	928LX/RX	929KS/020	939KS/020	969KS/120	969KS/220
CPU Type/Max. Number	PA-7100LC/1	PA-7100LC/1	PA-7200/1	PA-7200/1	PA-7200/1	PA-7200/2
CPU Speed	34MHz	48MHz	60MHz	78MHz	120MHz	120MHz
Max. Connected Workstations	152	400	2750	2750	2750	2750
Relative Performance (1)	1.3	1.8	3.3	4.6	6.7	12.4
RAM (min/max) MB	32/512	32/512	128/3840	128/3840	128/3840	128/3840
Disk Drives (min/max-range)	1/21-36	1/21-36	1/255	1/255	1/255	1/255
Storage (min/max-range) GB	4/414-684	4/414-684	9/9144(3)	9/9144(3)	9/9144(3)	9/9144(3)
I/O Backplanes	1	1	4(4)	4(4)	4(4)	4(4)
I/O Slots	2/4	2/4	36(4)	36(4)	36(4)	36(4)
DDS Tape Backup GB	4	4	4	4	4	4
Tape Drives	8	8	32	32	32	32
System Printers	6	6	4(5)	4(5)	4(5)	4(5)
Serial Printers	64	64	250	250	250	250
Typical Users (low/high)	24/64	64/160	40/230	64/300	130/500	230/850
Model (2)	989KS/400	989KS/600	989KS/150	989KS/250	989KS/450	989KS/650
CPU Type/Max. Number	PA-8200/4	PA-8200/6	PA-8200/1	PA-8200/2	PA-8200/4	PA-8200/6
CPU Speed	200MHz	200MHz	240MHz	240MHz	240MHz	240MHz
Max. Connected Workstations	2750	2750	2750	2750	2750	2750
Relative Performance (1)	28.7	33.2	11.1	21.3	35.2	41.7
RAM (min/max) MB	256/3840	256/3840	256/3840	256/3840	256/3840	256/3840
Disk Drives (min/max-range)	1/255	1/255	1/255	1/255	1/255	1/255
Storage (min/max-range) GB	9/9144(3)	9/9144(3)	9/9144(3)	9/9144(3)	9/9144(3)	9/9144(3)
I/O Backplanes	4(4)	4(4)	4(4)	4(4)	4(4)	4(4)
I/O Slots	32(4)	32(4)	32(4)	32(4)	32(4)	32(4)
DDS Tape Backup GB	4	4	4	4	4	4
Tape Drives	32	32	32	32	32	32
System Printers	4(5)	4(5)	4(5)	4(5)	4(5)	4(5)
Serial Printers	250	250	250	250	250	250
Typical Users (low/high)	580/1420	755/1655	225/725	385/1215	725/1625	945/1905

1. Relative to HP 3000 Performance Unit.

2. All HP 3000 900 Series systems come standard with one LAN Interface card and one system console.

HP 3000 SERVER PRODUCT LINE

969KS/320	969KS/420	979KS/100	979KS/200	979KS/300	979KS/400	989KS/100	989KS/200
PA-7200/3	PA-7200/4	PA-8000/1	PA-8000/2	PA-8000/3	PA-8000/4	PA-8200/1	PA-8200/2
120MHz	120MHz	180MHz	180MHz	180MHz	180MHz	200MHz	200MHz
2750	2750	2750	2750	2750	2750	2750	2750
17.5	21.5	7.9	14.6	19.5	24.4	9.1	17.2
128/3840	128/3840	128/3840	128/3840	128/3840	128/3840	256/3840	256/3840
1/255	1/255	1/255	1/255	1/255	1/255	1/255	1/255
9/9144(3)	9/9144(3)	9/9144(3)	9/9144(3)	9/9144(3)	9/9144(3)	9/9144(3)	9/9144(3)
4(4)	4(4)	4(4)	4(4)	4(4)	4(4)	4(4)	4(4)
36(4)	36(4)	36(4)	36(4)	36(4)	36(4)	32(4)	32(4)
4	4	4	4	4	4	4	4
32	32	32	32	32	32	32	32
4(5)	4(5)	4(5)	4(5)	4(5)	4(5)	4(5)	4(5)
250	250	250	250	250	250	250	250
330/1020	430/1120	150/550	260/930	370/1115	470/1240	180/630	310/1065
997/100	997/200	997/300	997/400	997/500	997/600	997/800	
PA-8000/1	PA-8000/2	PA-8000/3	PA-8000/4	PA-8000/5	PA-8000/6	PA-8000/8	
180MHz	180MHz	180MHz	180MHz	180MHz	180MHz	180MHz	
2750	2750	2750	2750	2750	2750	2750	
7.6	13.2	18.0	22.2	26.2	30.1	34.3	
256/3840	256/3840	256/3840	256/3840	256/3840	256/3840	256/3840	
1/255	1/255	1/255	1/255	1/255	1/255	1/255	
9/9144(3)	9/9144(3)	9/9144(3)	9/9144(3)	9/9144(3)	9/9144(3)	9/9144(3)	
12(4)	12(4)	12(4)	12(4)	12(4)	12(4)	12(4)	
168(4)	168(4)	168(4)	168(4)	168(4)	168(4)	168(4)	
n/a	n/a	n/a	n/a	n/a	n/a	n/a	
32	32	32	32	32	32	32	
8(5)	8(5)	8(5)	8(5)	8(5)	8(5)	8(5)	
250	250	250	250	250	250	250	
250/750	500/1100	700/1325	875/1475	1025/1600	1145/1695	1240/1765	

3. Using AutoRaid Disks 4. Using HP-PB I/O Card Cages. 5. SCSI-2 printer devices

HP 9000 SERVER PRODUCT LINE

Model	A180/A180C	R380	R390	K360	K370	K380
CPU Type/ Max Number	PA-7300LC/1	PA-8000/2	PA-8200/2 PA-8000/2	PA-8000/4	PA-8200/6	PA-8200/6
CPU Speed	180MHz	180MHz	240MHz/180MHz	180MHz	200MHz	240MHz
Cache (instr/data)	64KB/1MB	1MB/1MB	2MB/2MB	1MB/1MB	2MB/2MB	2MB/2MB
RAM (min/max)	128MB/ 2GB	128MB/ 3GB	128MB/ 3GB	128MB/ 4GB	128MB/ 4GB	128MB/ 4GB
Disks	2 Internal	1 Int. Removable	1 Int. Removable	4 SCSI	4 SCSI	4 SCSI
Storage (min/max)	18GB Internal 9.5TB External	18GB Internal 9.5TB External	18GB Internal 9.5TB External	6.7TB	13.9TB	13.9TB
Maximum I/O Configuration	2 PCI/HP-HSC	8HP-PB	8HP-PB	4 HP-PB 3 HP-HSC	4 HP-PB 3 HP-HSC	4 HP-PB 3 HP-HSC
HP-UX Supported	10.2 & 11.0	10.2, 11.0	10.2, 11.0	10.x, 11.0	10.x, 11.0	10.x, 11.0
Management Tools Included	WebQoS SecureWeb Console Ignite/UX	WebQoS SecureWeb Console Ignite/UX	None	None	None	None
Base Configuration Price	\$3,265 \$4,340 w/1MB Cache	\$10,515	\$10,515	\$36,915	\$49,915	\$49,915

HP 9000 SERVER PRODUCT LINE

K460	K570	K580	N4000	V2250	V2500 (1 Cabinet)	V2500 (4 Cabinets)
PA-8000/4	PA-8200/6	PA-8200/6	PA-8500/8	PA-8200/16	PA-8500/2-32	PA-8500/128
180MHz	200MHz	240MHz	360MHz/440MHz	240MHz	440MHz	440MHz
1MB/1MB	2MB/2MB	2MB/2MB	1MB/512KB	2MB/2MB	0.5MB/1MB	0.5MB/1MB
128MB/ 8GB	256MB/ 8GB	256MB/ 8GB	512MB/ 16GB	1GB/ 16GB ECC	1GB/ 32GB ECC	4GB 128GB ECC
4 SCSI	4 SCSI	4 SCSI	2 Internal HotPlug	16 Internal	16 Internal	64 Internal
21.1TB	35.5TB	35.5TB	18GB Int/ 71TB Ext	288GB Internal 40TB Fibre Chan.	288GB Internal 50TB Fibre Chan.	1.1TB Internal 200TB Fibre Chan.
8 HP-PB 5 HP-HSC	4 HP-PB 9 HP-HSC	4 HP-PB 9 HP-HSC	12 PCI	1/24	1/28	4/112 PCI
10.x,11.0	10.x,11.0	10.x,11.0	11.0	11.0	11.0	11.0
None	None	WebQoS SecureWeb Console Ignite/UX	None	None	None	None
\$60,915	\$76,995	\$76,995	\$53,110 w/2 meter rack \$50,510 w/existing 2 meter rack		\$320,645 w/2 CPUs per board \$326,645 w/2 CPU & SCA memory \$325,645 w/1 CPU per board \$331,645 w/1CPU & SCA memory	

SERVERS IN THE STRATUSPHERE

In the early 1980's, the founders of Stratus Computer, Inc. (Maynard, Mass.) had an idea: a system that would offer the fault-tolerance of Tandem computers without its closed architecture. "Tandem's fault-tolerant computers required a proprietary operating system and the fault-tolerance [components] were built-in to the operating system," says Steve Kiely, the president and CEO of Stratus.

A better design was to incorporate the fault-tolerant design into the hardware with minimum influence from the operating system. "That allows [for] support [of the] applications where any outage at all is unacceptable, or where it does not lend itself well to clustering." In 1992, Stratus chose HP's PA-RISC architecture for its Continuum series. After introducing the first product in 1994, Stratus signed a handshake agreement with HP to host HP-UX as a 100% binary compatible OS for Continuum servers in 1995. "We've had zero defects on compatibility," says Kiely.

What started out as a licensing deal for the processor and extended to the operating system, has evolved into a joint marketing relationship. "We saw interest from HP sales representatives to use Stratus technology where it fit" better than HP's, says Kiely. He points to the Continuum server installed in the Paris Bourse. The first joint sale with HP, the deal was won based on combining the continuous availability provided by Stratus with the openness of the HP 9000 platform. The relationship means that Stratus will keep up with the PA-RISC roadmap (Kiely says that the Continuum is generally four to six months behind HP's 9000 series in implementing new CPUs) and working on enhancements to HP-UX.

Stratus still markets and develops VOS, Stratus' original OS, which lent HP-UX some of its fault tolerant principles in the port to Continuum. But, Kiely explains, "We have a high level of loyalty in our VOS base; but in general, we're marketing HP-UX to our new customers." Now Stratus is a strategic partner in HP's Mission-Critical Computing Program that guarantees a continued alliance in technology, trademark licensing, channel access for customers and after-sale service. "HP proposes Stratus as an element of a total solution," says Kiely. HP and Stratus are also working on more co-marketing strategies.

In 1998, Stratus was bought by Ascend Communications, which was primarily interested in the telecom business side of the firm. Earlier this year, Ascend cut the computer division loose with the help of venture capitalists. "The intent," says Kiely, "is to take the company public in two to three years." Being cut adrift from Ascend has brought control. "We're free to make investments based on the long run without focusing on quarterly returns. We can also spend more funds on new product marketing than a public company might."

STRATUS' CONTINUUM SERVERS

Model	Processors	HP-UX Supported	Base Price*
412	96MHz PA-RISC 7100(1)	10.2 + 11.0	\$65,750
418	180MHz PA-RISC 8000(1)	10.2 + 11.0	\$140,500
428	180MHz PA-RISC 8000(2)	10.2 + 11.0	\$240,500
618	180MHz PA-RISC 8000(1)	11.0	\$274,000
628	180MHz PA-RISC 8000(2)	11.0	\$424,000
1218	180MHz PA-RISC 8000(1)	11.0	\$499,000
1228	180MHz PA-RISC 8000(2)	11.0	\$649,000

*Reflects only basic server configuration

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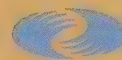
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long in the tooth" says Illuminata's Eunice. By mid-2000, says the META Group, the N-class will replace the aging K-class servers, while partially overlapping high-end V-class servers in performance." For example, the two new N-class systems can use up to eight 360MHz or 440MHz PA-8500s (in a single rack), HP's latest generation RISC CPU. And they are the first HP servers to be upgradeable (in-chassis) to Intel's IA-64 CPU.

According to HP's plan, users will be able to remove the PA-RISC CPU board as well as the associated bus converter and "simply" plug in the Intel IA-64 CPUs. But HP is still also planning PA-RISC upgrades for the N-class. Therefore, users can expect the N-class to be around the data center for some time.

The N-class is a particularly significant box because it's a "strong indicator of future technology and product directions for HP," says Christopher G. Willard of IDC. The N-class, notes Eunice, "is more about

I/O and moving data around — like a mainframe."

With four times the price/performance (vs. the K-class), the N-class resets the performance bar. And IT managers may want to note that other than price cuts, META Group analysts expect no competitive responses from Compaq, IBM or Sun until the first half of the Year 2000. META analysts also expect HP to announce a new high-end hybrid (code named "Superdome") to supersede the V-class. However, in the meantime, the META report concludes that "HP's N-Class servers offer users strong performance and P/P boosts and should enable HP to gain new account market share."

Unlike other HP 9000 servers, where only the latest version of HP-UX has been bundled, a user will find HP's SecureWeb Console software, which provides a multi-platform Web-based (Explorer or Navigator) administration console; Ignite/UX (formerly a \$595 HP-UX add-on) that

allows users to create a single system image and replicate it simultaneously on any number of HP 9000 servers; and WebQoS 2.0, HP's software for prioritizing access over the Web (see "It's The Server, Stupid" in the May issue of *HP Professional*).

All things considered, there are still obstacles that may impede HP's turnaround, warns Eunice. HP remains very channel focused as compared to Dell and its build-to-order philosophy. "Dell's build-to-order is a superior business model and business proposition with its customizability where, if you're Alcoa or GM, you buy just the right software for Alcoa or GM," says Eunice.

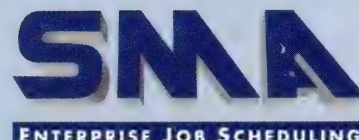
And Eunice feels that HP has to learn to command more of a presence in ISPs similar to Sun and Compaq. Nevertheless, HP is "orders of magnitude better in the last six or eight months," he says. "They're much more humble now. And they're well aligned with what they need to do. They just need the execution." ♦

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Model	E 60	LPr	LC 3
CPU/(Max.#)	Intel Pentium II/(1) Intel Pentium III/(2)	Intel Pentium II/(2) Intel Pentium III/(2)	Intel Pentium II/(2) Intel Pentium III/(2)
CPU Speed	400 MHz or 450MHz or 500MHz	400MHz or 450MHz 500MHz or 550MHz	350MHz, 400MHz or 450MHz 500MHz or 550MHz
L2 Cache	512KB	512KB	512KB
RAM (min/max)	64MB/1GB	64MB/1GB	64MB/1GB
Internal Disk Drives	4	2 hot-swap	3 hot-swap or 1 common trays
Maximum Internal Storage	72.8GB	36.4GB	54.6GB(hot-swap), 18.2GB(common tray)
I/O Expansion Slots	5 PCI; 1 PCI/ISA	3 PCI	5 PCI; 1 PCI/ISA
Disk Array Controller	N/A	HP NetRAID (optional) HP NetRAID-3Si	HP NetRAID (optional) HP NetRAID-3Si
SCSI Controller	Ultra/Wide SCSI	Ultra2 SCSI	Ultra/Wide SCSI
NI Controller	10/100TX PCI LAN	10/100TX PCI LAN	10/100TX PCI LAN
Management Tools Included	TopTools for Servers 4.1 NetServer Navigator	TopTools For Servers 4.1 OpenView ManageX/SE Remote Assistant TopTools Remote Control (optional)	TopTools For Servers 4.1 Remote Assistant NetServer Navigator OpenView ManageX/SE TopTools Remote Control (optional)
NOS Supported	Novell NetWare/NetWare Small Bus. Red Hat Linux 5.2 Windows NT Server, BackOffice Small Business Server SCO OpenServer	Novell NetWare/IntranetWare Red Hat Linux 5.2 Windows NT Server/MS-DOS OS/2 Warp Server Banyan Vines SCO OpenServer/UnixWare	Windows NT, Novell IntranetWare Red Hat Linux 5.2 SCO OpenServer/UnixWare OS/2 Warp Server/ Warp Server SMP BanyanVines
Tape Backup Support	SureStore T20Xi (on certain models)	N/A	N/A
Form Factor	Pedestal	2U (19-inch rack)	Pedestal
Pricing*(estimated street)	\$1,550	\$2,770	\$2,175

*Does not include mass storage, CPU upgrades, external storage or NICs

HP NETSERVER PRODUCT LINE

LH 3/LH 3r

Intel Pentium II/(2)
Intel Pentium III/(2)

350MHz, 400MHz or 450MHz
500MHz or 550MHz

512KB

128MB/1GB

12 hot-swap
2 common trays

218.4GB(hot-swap),
9.1GB(common tray)

8 PCI

HP NetRAID

Dual Ultra2 SCSI

10/100TX PCI LAN

NetServer Navigator
TopTools For Servers
OpenView ManageX/SE

Installation Assistant
TopTools Remote Control (optional)

Windows NT 3.51/4.0,
Novell Netware
Netware SFT III/IntranetWare
OS/2 Warp Server, Banyan Vines
Red Hat Linux 5.2
SCO UnixWare/OpenServer

N/A

Pedestal (LH3) or 8U (19-inch rack)

\$4,249

LH 4/LH 4r

Intel Pentium II Xeon/(4)
Intel Pentium III Xeon/(4)

400MHz, 450MHz
500MHz or 550MHz

512KB/1MB

256MB/4GB

12 hot-swap
2 common trays

218.4GB(hot-swap),
9.1GB(common tray)

8 PCI

HP NetRAID

Dual Ultra2 SCSI

10/100TX PCI LAN

Remote Assistant

NetServer Navigator
TopTools For Servers
OpenView ManageX/SE

TopTools Remote Control (optional)

Windows NT Server
Red Hat Linux 5.2
Novell NetWare/IntranetWare
SCO OpenServer/UnixWare
OS/2 Warp Server

Internal SureStore DLT

Pedestal (LH4) or 8U (19-inch rack)

\$7,198

LXr 8000

Intel Pentium II Xeon/(4)
Intel Pentium III Xeon/(8)

400MHz, 450MHz
500MHz or 550MHz

512KB/1MB/ 2MB

256MB/8GB

2 hot-swap

NetServer Rack Storage/8-Support for
eight 18.2GB or 9.1GB drives

10 PCI; 1PCI/ISA

NetRAID-3Si

Dual Ultra2 SCSI

10/100TX PCI LAN

Remote Assistant
TopTools For Servers
TopTools Remote Control

Windows NT 4.0/4.0E,
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Multilayer Switching

Making A "MIS-Match"

HP-UX And HP 9000 Servers Team Up For 64-bit Performance.

YOU CAN'T TALK ABOUT COMPUTER hardware without mentioning operating systems. The two — like an oil and vinegar emulsion — are inextricably linked. In the case of HP 9000 servers, that's HP-UX. First released in 1986, HP-UX is now in its 64-bit and eleventh version. And HP-UX is the heir apparent to MVS in the data center — if you believe in HP's long-term vision.

George A. Thompson

Because HP-UX 11.0 does away with the 4GB memory addressing constraint of 32-bit operating systems, the OS supports additional as well as larger applications and data sets; thereby reducing disk (cache) swapping. "You're only limited by the amount of physical RAM in your system," says John Verrochi, HP-UX product manager. For example, a 32-way V2500 (using PA-8500 CPUs) with HP-UX 11.0 recorded the industry's best single-system performance — 92,832 tpmC — and price/performance results — \$87/tpmC.

Other advantages of the larger addressing space for users of HP-UX 11.0 include a native 64-bit version of SAP R/3. Recently announced at SAPPHIRE '99 (Nice, France), the SAP user group conference, SAP's 64-bit R/3, combined with HP-UX 11.0, will support a larger number of SAP users. Consequently, enterprises are no longer required to spread their R/3 system across a large number of

servers in order to meet performance requirements. For example, Braun AG (Kronberg, Germany), a Gillette Company subsidiary, reported that after implementing a pilot of the 64-bit R/3-HP-UX 11.0 solution, users are now able to simultaneously process four batches of data (an improvement of 100%) in 32-bit mode. Overall, SAP transactions increased by 30%.

CLIMBING THE SCALES

Similarly, SAS Institute (Cary, N.C.) also recently announced — available only on HP-UX 11.0 — the first 64-bit SAS Scalable Performance Data (SPD) Server (its high-performance data store). IT managers responsible for ERP installations should take note that there are also 64-bit HP-UX-compatible versions of Informix, Oracle and Sybase databases. According to Verrochi, HP-UX is also the choice of seven of the nine top commercial ISVs. For example, i2 Technologies, he notes, was the first

non-database ISV to develop a 64-bit application of its supply chain software.

Verrochi says that HP-UX 11.0 arrived about six months and a year before 64-bit versions of IBM's AIX and Sun's Solaris 7 respectively. Consequently, he claims that "has allowed HP-UX to attract a large portfolio of applications of ISVs who have revved their application software to take advantage of HP-UX 11.0." Extension Packs, pushed out to HP customers with support contracts, have added new functionality to 11.0 about every two to four months, he says.

While HP-UX 11.0 (which actually began shipping in November 1997) comes in 32- and 64-bit versions, at this writing, HP's installed base is predominantly running HP-UX 10.2. First introduced in August 1996, HP-UX 10.2, is the previous (32-bit only) release of HP-UX. "Up until 11.0, we've been gradually providing 64-bit functionality in our HP-UX 10.x releases," says Verrochi. For instance, HP-UX 10.2 was the first version of HP-UX to support the 64-bit PA-8000 CPU.

However, the META Group observes that HP's newly introduced N-class systems (like the V-class) require the 64-bit version of HP-UX 11, "which many users have not yet adopted and may not in the latter part of 1999 due to Y2K lockdowns." Verrochi admits that new system orders (primarily the V-class) have been driving the adoption of HP-UX 11.0, but he now sees a wider adop-

tion "spanning D- and K-class servers" as well as the A- and R-class servers (designed for ISPs). Customers with support contracts can receive HP-UX 11.0 at no extra charge. And Verrochi says that recently, between 25,000 and 30,000 HP-UX 11.0 licenses have been requested.

THE CONDITION OF TRANSITION

Because of different file systems between HP-UX 9.x to 10.x, Verrochi acknowledges a "slight bump" in that upgrade. Customers, he says, "told us that the transition could have been a little smoother." But he quickly adds, from 10.x. to 11.0, "we absolutely maintained binary compatibility [for applications]."

IT managers who don't already know, should be aware that HP-UX 9.x cannot be made Y2K compliant. Hence, most HP customers have jumped on the 10.x bandwagon, for which there are available Y2K patches (downloadable from www.software.hp.com/products/Y2K). And if only for the reason of Y2K readiness, movement to HP-UX 11.0 (which also requires patches for Y2K compliance) is now underway, although as of April 1999, "there are more 10.x apps than 11.0 apps," says Verrochi. According to HP figures, there are 15,000 applications written for HP-UX.

As "the mainframe alternative of choice," HP-UX development has necessarily focused on reducing downtime; or in IT vernacular, making HP 9000 systems highly available. In that regard, HP has been touting its HP-UX-based *MC/ServiceGuard* clustering technology solution as well as the 5nines:5minutes (99.999% of uptime equals only five minutes of yearly downtime) program (with partners EMC, Cisco Systems and Oracle). IT managers should note that the goal of 5nines:5minutes is to extend availability up through the hardware and OS *to the applications*.

Other examples of HA capabilities within HP-UX that maximize system uptime include Dynamically Loadable Kernel Modules (DLKMs) that allows

the HP-UX kernel to be modified on the fly without requiring a reboot. And Dynamic Memory Resilience (DMR), which, explains Verrochi, continuously checks the physical RAM for parity errors and, "if it encounters any [errors], it de-allocates those memory pages away from further execution by applications. The key benefit is process execution protection and avoidance of data corruption."

11.0 AND COUNTING

Verrochi notes that DLKM technology will be extended into something called *Online Addition And Replacement* and applied later this year to the N-class for the online addition and replacement of I/O – or input output drivers – to disk. In the first half of Year 2000, HP-UX will extend that to the online addition and replacement of the RAM and CPU. "We will have hot-swapping hardware, consisting of CPU and RAM (or 'cell'), which will be replaceable without having to take the system down." Also on tap for HP-UX says Verrochi, is dynamic processor de-allocation. Similar to DMR, HP-UX will sense and inactivate failing CPUs (within an SMP system) and route activity to other up and running CPUs.

Other important features of HP-UX include System Administration Manager (SAM), Software Distributor and Ignite/UX, which provides for a "golden" single image of multiple servers. Ignite/UX is now being bundled with HP's N-class servers (see feature story on page 30); as is WebQoS, HP's software for prioritizing, optimizing and stabilizing Web Server resources.

Although HP has been criticized for missing Internet opportunities, HP-UX 11.0 is bundled with the following: Netscape FastTrack Server, Oracle Web Application Server and Java Virtual Machine, Just-in-time compiler for Java and Java Software Development Kit. And HP-UX will figure prominently in HP's E-services vision.

"Because E-services requires sophisticated and complex system management capabilities, we will continue to incorporate greater functionality on the systems manageability front," says Verrochi. ♦

HP-UX LIFELINE

10.0 July 1995

- SMP performance
- MP networking
- Single Series 700-800 kernel source tree with converged features
- MP-safe Series 700 features
- I/O system infrastructure rewritten into generic and framework-specific portions
- Disk sorting and request merging reworked for better performance and safety
- SMP tuning, up to 12-way
- JFS, Online JFS
- C2 Security
- Software Distributor
- SAM
- Memory page de-allocation

10.10 February 1996

- UNIX 95-branded
- CDE compliance
- Large file system: up to 128GB
- Large memory: 3.75GB
- 60,000 file descriptors
- NFS diskless

10.20 August 1996

- Large local files to 128GB
- Distributed Print Service
- PA-8000 performance tuning
- Enhanced internet capabilities

10.30 August 1997

- Kernel threads

11.00 November 1997

- Support for 32-bit and 64-bit applications and platforms
- 4TB very large memory support

11.0 Extensions (to date)

- 9804
- 9806
- 9808
- 9810
- 9812
- 990P(forthcoming)



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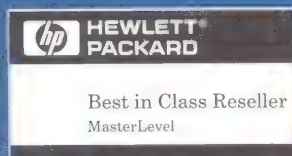


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C Shells To Be Sure

HEEDING CONVENTIONAL WISDOM can be a good thing, although there are drawbacks to following it at times. For instance, when new information is introduced. Conventional

wisdom says that System Administrators should use derivatives of the **bourne** shell (**sh**, **ksh**, **bash**). It also suggests that users should use the **C** shell (**cs**h).

The reasons for this are historical. Way back in the dark ages (before the term 'information superhighway' was coined), only the **C** shell had interactive usage features like history, jobs and aliases. Currently, which shell you use is a matter of preference, because there are several shells available that have all the usual interactive features.



Fred Mallett
frederm@famece.com

SHELLING OUT CSH

For users that have the **cs**h as their login shell, why not try the **tc**sh, officially named *The Enhanced C Shell*, instead?

It's available on the network in several places for ftp downloads. You might try [ftp.deshaw.com](ftp://ftp.deshaw.com/pub/tcsh) in `/pub/tcsh` or [ftp.gw.com](ftp://ftp.gw.com/pub/unix/tcsh) in `/pub/unix/tcsh`. Compiling and installing instructions are included in the tar file. Most sites install **tc**sh in `/usr/local/bin`, though I have several customers with it in `/usr/bin` or `/bin`.

If you, as a system administrator, want to allow users to have the **tc**sh for a login shell, its complete pathname must be listed in `/etc/shells`. If your system does not have that file

and you create it, be sure to list all shells that are valid as login shells, not just the pathname to **tc**sh.

Once installed and edited into `/etc/shells`, a user can use the **ch**sh command to make the **tc**sh their default login shell. Be sure to include the complete pathname to **tc**sh when running **ch**sh. This can be found with the command **which tc**sh.

The funny part about having a system administrator go through all that work, is that many people are not aware of the **tc**sh even if it is installed. For example, at one of the sites where we do a lot of training, they have over 4,000 entries in the NIS password map. Of those, over 3,500 use the **cs**h. Only 285 were using the **tc**sh (most of the remaining were using **ksh**).

Since **tc**sh is a complete superset of the functionality of the **cs**h, there's no training period required. You can use the **tc**sh exactly like the **cs**h, in fact, it will even read the same `.cshrc` startup file. Then you can start learning about the new features when you have time.

PROS AND CONS

First the disadvantages. Actually, I can only think of one, and we already mentioned it. The **tc**sh is not shipped with most systems, *HP-UX included*. This means that you cannot use **tc**sh unless someone properly installs it on your system.

In addition, there are some annoying quirks about the **tc**sh command and file spelling correction mecha-

nism. Luckily, you can turn it off (or customize it). More on that later.

As for the pros, the **tc**sh man page lists the enhancements from the **cs**h. There are many, but the best are:

- Command line editing
- Visual history recall
- Automatic terminal setting sanity check
- Improved command completion
- More powerful prompt assignments
- More variables
- Enhanced wildcards

To see if **tc**sh is installed, issue the command **which tc**sh from a **cs**h. If it returns a pathname, **tc**sh is available. You can enter **exec tc**sh to change your current **cs**h to a **tc**sh. Better yet, change your login shell to **tc**sh with the **ch**sh command (on HP-UX) as mentioned above. To see if it worked, logout and back in, then issue **echo \$tcsh**.

If it returns a version number, you're in the **tc**sh. If you get an "Undefined Variable" error, you're still in a **cs**h (or somehow ended up with a **korn** shell). If the **ch**sh didn't work, ask a system administrator for help (or e-mail me).

DEEP C EXPLORATION

Now that you have a **tc**sh running, let's explore a little bit. The first two features in the list above are enabled together with the **bindkey** command. The **-e** option enables **emacs**-style command line editing. The **-v** option enables **vi**-style. Choose the editor you're most comfortable with. Details of the editors can be found in the **tc**sh

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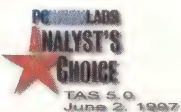
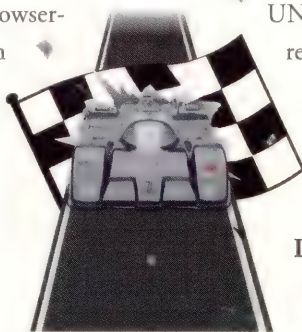
NT File/Print/Application Services: NT users access files and printers residing on UNIX servers using normal NT functions. TAS also enables NT users to access NT applications stored on a UNIX server.

Common File System: Data and applications are stored in a central TAS-based server where NT and UNIX users can easily access the same data.

Transparent to the NT Desktop: The TAS server is seen by NT users as a PC server, so users do not need to know UNIX to access resources on that server. No retraining is involved.

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NightWatch for NT

Current Status from DELL at 2/2/99 4:20:55 PM

Current State	Waiting	Current Alarms	7	Total Alarms	2
Monitoring Started	2/2/99 4:03:16 PM	Last Scan	2/2/99 4:19:15 PM	Errors	4
Last Alarm Start	2/2/99 4:03:58 PM	Last Page Sent	2/2/99 4:19:43 PM	Page Queue	1
Interval	900	Paging Enabled	True	In Quiet Period	False

Start Monitoring Stop Monitoring Disable Paging Enable Paging Show Activity Log

Object Type	Object ID	Last Alarm Start/End	Status
Event Log	Security on DELL	N/A	OK
Event Log	System on DELL	N/A	OK
NT Service	awhost32 on DELL	2/2/99 4:03:58 PM	Please start
NT System	151.198.66.34	N/A	OK
NT System	TECHSERVER	N/A	OK
Ping	1.1.1.1	2/2/99 4:03:58 PM	Fake Serve
Ping	DEC.hillary.com	N/A	OK
Ping	hp3000.hillary.com	N/A	OK
Ping	rs6000.hillary.com	N/A <td OK	
Syslog	N/A	N/A	OK
Web Page	http://www.hillary.com	N/A	OK
Web Page	https://www.remotesite.com	N/A	OK

NightWatch for NT Version 1.1.7 Released 12-08-98
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NightWatch for NT

Current Activity Log from DELL at 2/2/99 4:32:16 PM

Clear Log Show Status

INFO	2/2/99 4:21:48 PM	Processing of Notification Requests completed...
INFO	2/2/99 4:21:43 PM	Executing page for awhost32 on DELL with C:\Program Files\NightWatch for NT\Alerts\TA
INFO	2/2/99 4:21:43 PM	Processing Notification Requests...
INFO	2/2/99 4:21:06 PM	Status request serviced for 151.198.66.26
INFO	2/2/99 4:20:55 PM	Status request serviced for 151.198.66.35
INFO	2/2/99 4:20:06 PM	Scan complete
INFO	2/2/99 4:20:06 PM	Scanning event log Security on DELL
INFO	2/2/99 4:19:43 PM	Processing of Notification Requests completed...
INFO	2/2/99 4:19:42 PM	Checking https://www.remotesite.com
WARN	2/2/99 4:19:42 PM	NetServerGetInfo failed: (5) Access is denied.
INFO	2/2/99 4:19:39 PM	Checking 151.198.66.34
INFO	2/2/99 4:19:39 PM	Checking TECHSERVER
INFO	2/2/99 4:19:39 PM	Scanning event log System on DELL
ALARM	2/2/99 4:19:38 PM	From start prAnywhere
INFO	2/2/99 4:19:38 PM	Checking awhost32 on DELL
INFO	2/2/99 4:19:38 PM	Processing Notification Requests...
ALARM	2/2/99 4:19:38 PM	1.1.1.1 Fake Server is Down
INFO	2/2/99 4:19:36 PM	Pinging 1.1.1.1
INFO	2/2/99 4:19:34 PM	Checking http://www.hillary.com
INFO	2/2/99 4:19:34 PM	Get file (FTP) 151.198.66.2:/home/cpl/template
WARN	2/2/99 4:19:33 PM	(25/22) Operation timed out waiting for response from server
INFO	2/2/99 4:19:16 PM	Get file (FTP) 151.198.66.4:/NIGHTWAT/PUB/dif/zoff
INFO	2/2/99 4:19:16 PM	Pinging hillary.hillary.com
INFO	2/2/99 4:19:15 PM	Pinging hp3000.hillary.com
INFO	2/2/99 4:19:12 PM	Polling Message Server
INFO	2/2/99 4:19:12 PM	Begin a Scan
INFO	2/2/99 4:06:06 PM	Status request serviced for 151.198.66.26

NightWatch for NT Version 1.1.7 Released 12-08-98
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Are my DEC, HP3000 and IBM RS6000 servers up and running? **YES**

Is SECURITY OK on the NT Server? **YES**

Is the remote INTERNET site up and running? **YES**

Is the REMOTE LOGIN enabled for the network? **YES**

Are our WEB pages available to our customers? **YES**

Get and review a process LOGFILE on the HP9000. No ERRORS reported? **YES**

A process LOGFILE on the HP3000 is searched for error strings. No ERRORS found? **YES**

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man page. Both command line editor styles allow you to do more than backspace over a command (which is all the `cs` allows). This is called "Command Line Editing."

If you're entering a command and realize you made an error in the path-name several characters back, you can use standard editor commands to move the cursor back and fix it without losing the rest of what you typed. In `vi` mode, hit `<esc>` to get to `vi` commands, then issue editor commands: In `emacs` mode, use the usual `emacs` control sequences.

As long as you have either `emacs`- or `vi`-style command line editing enabled, you also have the visual history capability enabled. After issuing several commands, you can use the up arrow key to recall previous ones. They are merely printed on the command line, so you can also perform edits on them before pressing

tcsh is a complete superset of the functionality of the cs. There's no training period required.

`<return>` to issue (or `<ctrl-c>` to abort) the command. If the arrow key does not work, or if you prefer, you can also use `<ctrl-p>` to recall previous commands (`<esc-k>` in `vi` mode).

BOUND BY STRINGS

The `bindkey` command can also be used to map editor commands, commands or strings to a key. This can really save time if you use long commands or strings often.

The `cs` has command and user-name completion, which all you `cs`

users should be familiar with, and using. In the `cs`, if the `filec` variable is set, you can type part of a filename, then hit `<esc>` and the shell will fill in the rest (if what you typed was unique). If what you typed was ambiguous, a `<ctrl-d>` will provide a list of possible completions so you can type enough to allow the shell to complete the name for you.

The `tcsh` does the same thing, with the exception that it uses the `<tab>` key instead of the `<esc>` key to invoke the completion. It also can complete variables. For example, if you type in `echo $tc<tab>`, it will complete the rest of the variable named `tcsh`.

The `tcsh` also allows you to program completions to work in a specific manner. This is done with the built in command called `complete`. ♦

Want more? Next column we'll look at some more features of the tcsh.

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Any Port In A Scanning Storm

THE MOST BASIC TOOL in any cracker's arsenal is the port scanner, which is used to probe systems for possible ways to exploit any security weakness. But scanners can also

be used by system administrators to locate and fix weaknesses before their systems are compromised.

In the dark ages, before everyone had an Internet connection, scanning was done via war dialers which dialed every phone number in a central office exchange looking for a modem tone. Once a modem was found, the attacker dialed the number and tried to break in.



Ryan Maley
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The reason port scanning may be an effective cracking tool is because operating systems have known vulnerabilities and exploits. For instance, many Windows 95 systems are subject to the "Land Attack," which uses fake IP packets with identical source and destination IP addresses.

The Windows 95 machine tries to respond to itself over and over, slowing down and possibly crashing. Microsoft has addressed this bug. The fix is available at support.microsoft.com in article Q177539. This exploit only works on Windows 95 machines without the bug fix applied, so there's no point in trying the attack against a Windows 98 machine.

CRACKERS IN BED

How does a cracker go about finding an un-patched Windows 95 machine listening on TCP/IP ports? With a port scanner, the procedure is simple. It scans a set of network addresses to determine the operating system and open ports. Compare this list against a list of possible vulnerabilities. If a match is found, try to apply the exploits.

Because vulnerabilities are well publicized, it's pretty easy to find possible ways to attack systems. But it's also easy for administrators to close these holes before their security is compromised. The best way to do this is to get a port scanner and test your own systems.

The best freeware scanner I've

found is *nmap*. It's a great tool for testing your own systems. It runs very well on Linux and is available for other platforms as well. The *nmap* site (www.insecure.org) contains quite a bit of documentation about scanning techniques and lists exploits for NT, Linux, Solaris and other platforms.

For Windows NT, there are several freeware and commercial scanners available, but none offers *nmap*'s range of options. Aside from being very fast and offering flexible features such as node discovery and the ability to scan ranges of IP addresses, *nmap* is very strong in stealth scanning.

INVISIBLE TO RADAR

Stealth scanning is difficult to trace and is the preferred method of the cracker. The most basic port scan uses the *connect* call to a port. If the node is listening on the port, *connect* succeeds and the scanner closes the port.

Scan These Links

UNIX SCANNING TOOLS

nmap the best! www.insecure.org
Satan ftp.porcupine.org/pub/security/

WINDOWS NT SCANNING TOOLS

Asmodeus www.webtrends.com
Network Toolbox www.jriver.com
Internet Maniac members.xoom.com/codemaniac/maniac/

SCAN DETECTION SITES

Internet Security Systems www.iss.net
Network Associates www.nai.com

PORTS OF CALL

Scanning today is done via the Internet. Using TCP/IP, processes communicate with each other through ports. Common processes such as telnet and FTP (so called "well known services") are assigned standard ports that they always use. These "well known ports" will always be the same.

When a browser is pointed to *HP Professional's* Web site for instance, it knows to communicate with the www.hppro.com computer node on port 80. The www.hppro.com node "listens" to its port 80 and, when it gets a connection, starts serving up Web pages. So now, instead of looking for a modem connection, an attacker can scan the ports of a system, see which ports are listening and possibly use the port as an entry into your system.

Connect scans are very easily traced because log files will show the connections and errors as the scanner closes the ports. If you show lots of log entries along lots of ports, you're being scanned.

Stealth scanning uses other techniques such as the synchronize, or SYN scan. The SYN scan is a *partial connect*. Basically, a SYN packet is sent as if a real connect were taking place. The answering node sends an acknowledgement (ACK) packet to say, "I'm listening." The stealth scanner then ends the connection instead of proceeding with a standard connect. Fewer systems log SYN scans, so system administrators don't realize they're being probed for vulnerabilities. *Nmap* supports other stealth scans such as FIN (in which a FINish TCP/IP packet signals the end of communication), fragmentation, reverse ident, FTP bounce and User Datagram Protocol-Internet Control Message Protocol (UDP ICMP) scan-

ning.

Given the wide variety of stealth scans available, it's possible to scan a system without being detected. A good firewall, however, will deter most scans. But many systems on the Internet are without the benefits of firewall protection, notably, public Web servers.

SCANNING BALLISTICS

Some commercial products are available to detect port scanning such as Internet Security Systems' (Atlanta, Ga.) Internet Scanner and Network Associates' (Santa Clara, Calif.) Ballista. Checking your own systems will show where your vulnerabilities lie. It's not good enough to have a product report. If an exploit is discovered it's possible that your system will be compromised before you read your logs.

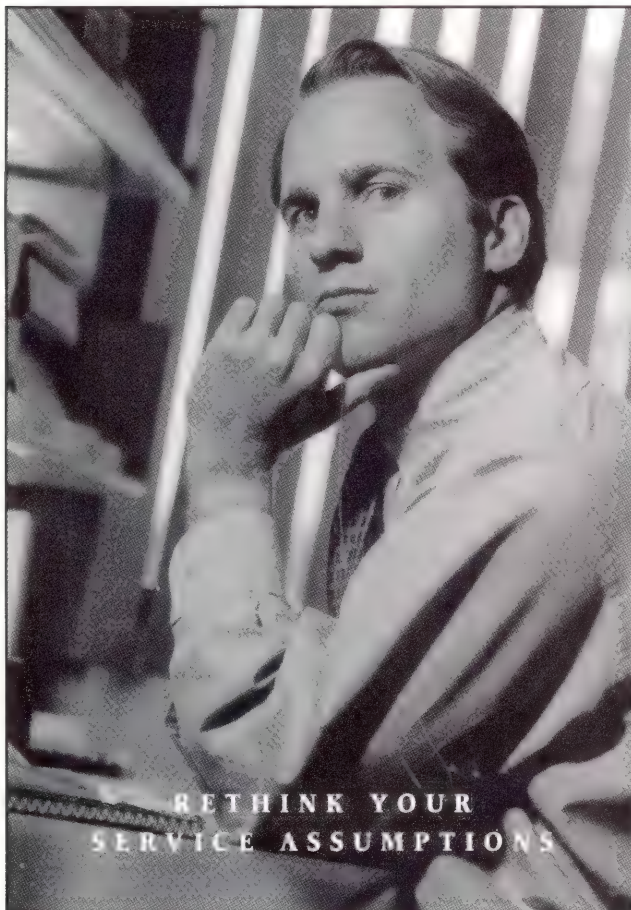
Because scanners are often used as the first probe in an attack, system administrators should familiarize

themselves with scanning techniques. At the very least, secure your system from the most basic scanning technique of all — telnet. Sadly, many systems still announce the operating system and version before a user logs in. By just Telnetting to port 25 and watching for the prompt, it's possible to learn a lot about a system. For instance, by default, Red Hat Linux displays its release number, kernel version and processor type:

*Red Hat Linux release 5.2 (Apollo)
Kernel 2.0.36 on an i686
login:*

Just by changing your system announcement to read "Unauthorized Use Is Prohibited," you've taken the first step towards securing your system. By using a port scanner to probe your systems before the bad guys do, you should be able to secure them.

And don't forget to check your logs. You never know who's trying to sneak in through your ports. ♦



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When The STARs Come Out

INDEPENDENT CERTIFICATIONS are becoming increasingly accepted in the IT industry. The Microsoft Certified Systems Engineer (MCSE) program is renowned worldwide

and others, like Compaq's Accredited Systems Engineer (ASE) and HP's Systems Training and Recognition (STAR) programs, are growing in popularity. A large number of resellers are using certification programs as a means to obtain partnerships with vendors. Some use them as a yardstick for hiring personnel.

CERTIFIED CONFUSION?

Recently, HP inserted OpenView into the rapidly growing world of certification programs by launching its *Authorized Partner Program and Certification Program for Professionals* to increase industry recognition and provide technical expertise for customers. Resellers are required to have at least one Certified OpenView Consultant and one trained sales person at each location to qualify as partners.

For full information on the HP Authorized Partner Program, download the product brief at www.openview.hp.com/docs/44.pdf. The Partner Program is well thought out and offers excellent means to increase business for HP and its partners. The Certification Program, however, needs a lot of work.

HP awards the title of *OpenView Certified Consultant* to candidates who have successfully completed two exams. These are *Introduction to OpenView* and *Network Node Manager (NNM)*. According to HP, the OpenView Consultant is "capable of configuring and installing NNM as a stand-alone management system." They also state that OpenView

Consultants are "*not certified to integrate other HP OpenView and third party applications.*" Now, it gets confusing.

No matter how well defined the OpenView consultant's capabilities, it's not reflected in the title. Unlike other certifications where the title aptly describes the consultant's role, this one is too general. Unfortunately, it lends itself to a wide range of interpretations.

In my experience, colleagues and customers ask me to demo OpenView products that I've never worked on. It is frustrating and embarrassing at times to constantly explain what I can or cannot do.

CLASS FEEDBACK

HP must have received plenty of feedback. A few months after the introduction of the Certification Program they restructured it. Now there are six solution areas: *Network Management*, *NT Server and Applications Management*, *Unix Server and Applications Management*, *IT Service Manager*, *Desktop Management*, and *Storage Management*. While the Introduction to OpenView exam is still required, candidates can now choose which solution area they want to focus on.



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For detailed information about the *OpenView Certification Program for Professionals*, the product brief can be downloaded at www.openview.hp.com/docs/153.pdf. Currently, exams are available for *Network Node Manager*, *IT/Operations*, *ManageX*, *OmniBack II*, *IT Service Manager*, *Desktop Administrator*, and *PerfView/MeasureWare*.

With these changes, the primary goal is to "allow consultants the opportunity to specialize and diversify." More importantly, it provides specific labels for consultants. For example, consultants can now use the title of *OpenView Certified in Network Management*.

PROMISES TO KEEP

Hopefully, this will decrease the confusion brought about by the OpenView Certified Consultant title. It's too early to tell whether these changes will work. But so far, it looks promising. For resellers, it's definitely a good step towards increasing the awareness of OpenView and establishing technical credibility.

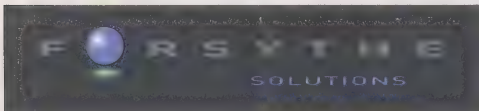
— Stanley T. Ong is a systems consultant for Onyx, (Thornhill, Ontario, Canada), an HP Best-in-Class Reseller and HP OpenView Authorized Partner. He is now certified in *NT Server and Application Management*.

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Doing The Interop Bop

EVERY SPRING, Elvis impersonators and networking vendors converge on the desert oasis that is Las Vegas. And every spring, as they desperately try to define a niche in

the networking market, they convert it into a battlefield of sideburns, hype and technical bombshells. You guessed it. I'm just back from NetworkWorld+Interop.

SIMPLE TRADESHOW MANAGEMENT

Day one found me in the SNMP Research booth talking SNMPv3 with Dr. Jeffery Case, SNMP Research's founder, and one of the original authors of SNMP. He was excited about SNMPv3. You might say he's betting the farm on it. He was introducing a new "super" SNMP agent specifically designed for systems, applications and service management. More importantly it speaks all versions of SNMP including SNMPv3. After a somewhat flawless demo and some SNMP reminiscing I moved on, hungry for more.

I spent much of the remaining day on the show floor looking and absorbing. After a dinner with friends, I felt "lucky." The feeling of good fortune passed quickly. I was "lucky" that I only lost \$120.

Day two started at HP's booth. I wanted to come up to speed on HP's Firehunter (service management) ManageX (NT management) products. Firehunter seems to be competing with many other products out there that work better and faster. On the other hand, ManageX is thorough



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and well thought through. I especially liked the application management plug-in modules such as Microsoft Exchange management.

SELF-PROPELLED

Next came the Loran Technologies booth. Loran has a product called Kinnetics, which is a Web-based management product they call a "true network appliance." It's a turnkey solution that you plug into your network, provide an IP address, subnet mask and default gateway and it's off. From the demo it appears to live up to its promises. I will be investigating this product more in the coming months. The rest of the day I spent walking the remainder of the South Hall in the convention center.

Day three, the last, is always the

most important. Time to finish the last half of the showfloor. That's only about 400 small booths in six hours. Lot of literature and business cards (for Palm Pilot giveaways) later, I was talking with Dr. Case again about SNMP and the network biz. He hasn't missed an Interop in the United States for over 10 years. He claims the industry is brighter now and has more potential than it ever has.

I still don't know when Windows NT 5 is going to be released. But OK, I admit it. I didn't quite make it to Microsoft's booth. But I did snag two personally autographed pictures of Elvis.

— Charles Hebert is President of Southernview Technologies, Inc. (Marietta, Ga.) and the Chairman of the Program Committee for the 1999 OpenView Forum & Universe Conference.

Network/Interop Technology Highlights

Kinnetics
 Loran Technologies, Inc.
[\(www.kinnetics.com\)](http://www.kinnetics.com)

Client
 SNMP Research
[\(www.snmp.com\)](http://www.snmp.com)

ManageX
 HP
[\(www.openview.hp.com/products/managex\)](http://www.openview.hp.com/products/managex)

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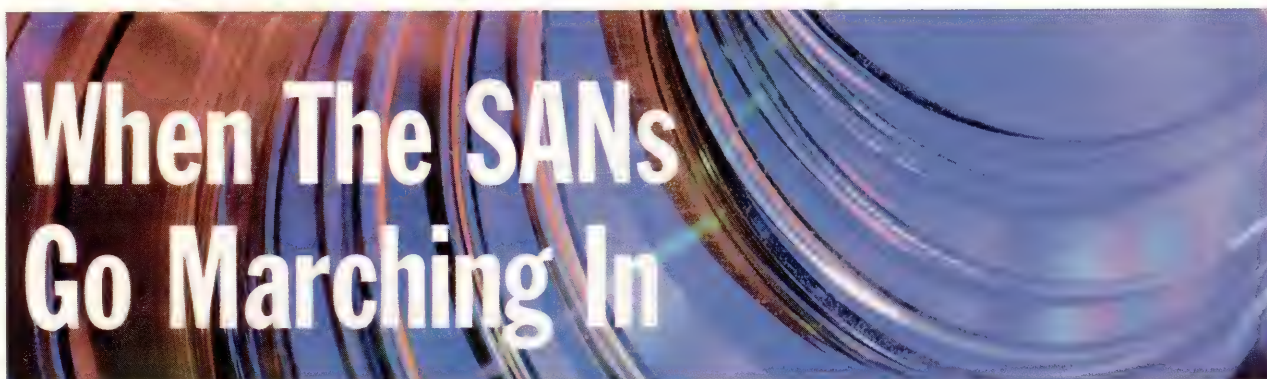
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Behind The Networks Behind The Servers

By Scott K. Cleland

When computing resources were used only for internal operations, the cost of information bottlenecks and network failures was limited to lost productivity. However, as computing resources are used to engage customers, as well as manage operations, bottlenecks and network failures translate into lost productivity and lost business. A primary benefit provided by Storage Area Networks (SANs) is the ability to unclog network arteries by moving bulk data transfers off client networks and onto specialized sub-networks, often referred to as *the networks behind the servers*. With SANs, pools of storage (and related traffic) are removed from the LAN, externalized and shared by mainframes, UNIX and PC servers.

External RAID Clustering With SAN Connectivity

Fibre Channel Interface. Fibre Channel is the optimal interface for storage arrays used in SAN applications. It provides the performance, distance and scalability required for SAN environments. The Fibre Channel standard is widely supported and a broad range of Fibre Channel interconnect devices (hubs and switches) and storage devices (RAID arrays, tape and optical libraries and disk, tape and optical drives) are available with varying levels of features and performance in a competitive market environment.

Dual Channels. High performance SAN-attached storage devices require multiple front-end SAN channels for performance and fault tolerance. Dual channel arrays offer twice the potential performance of single channel arrays at marginally higher costs and provide continuous data access if a SAN interconnect device or link fails.

Heterogeneous Host Support. Most enterprises have heterogeneous computing environments with mainframes in the data center and UNIX, NT or NetWare servers distributed across the network. Investments in these systems (acquisition, application development and infrastructure costs) are substantial and migration to a homogeneous environment is a multi-year proposition. SAN-attached RAID arrays should support storage volumes formatted with different file systems and allow heterogeneous systems access to those volumes.

Data Availability Features

Redundancy With Duplex RAID Controllers. SANs should be designed without any single point of failure that can cause storage devices to become inaccessible. SAN-attached arrays should be configured with duplex controllers and with the disks connected to both controllers. Multiple SAN interfaces (on each controller) and duplex controllers with shared disks provide the level of fault tolerance required in SAN configurations.

Transparent Host Independent Failover/Failback. In addition to redundancy, controllers should implement a transparent failover/failback scheme such that logical disks, (i.e., logical arrays) are continuously accessible. With a Fibre Channel interconnect, each controller requires a port held in reserve to accommodate a controller failover, (i.e. assume

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a failed controller's port ID). Although the Fibre Channel standard allows ports to have multiple addresses, this feature has not been implemented in Fibre Channel chips. Failover and fail-back should be implemented such that transitions occur without any required host intervention.

Alternate Path Support. Following the no single point of failure principle, SAN-attached servers should have redundant Host Bus Adapters (HBAs) with alternate path software support. Alternate path is generally implemented as a software driver and provides a level of indirection between the OS and HBAs. If one HBA fails, the driver redirects I/O's intended for the failed HBA to the alternate HBA so that I/O requests can be satisfied without the host OS knowing that an alternate path to storage was used.

Data Integrity Features

Mirrored Write Caching. Most external RAID controllers implement write-back caching to enhance performance but few implement a mirrored write-back caching scheme to protect data. Data in a controller's cache is vulnerable to power loss or controller failure until it is written to disk. To make matters far worse, if data in a write-back cache is lost, the application is oblivious to the loss since the controller has already acknowledged the write operation as complete.

Controller battery back-up units can hold-up cache contents during power outages but cannot move cached data to an operational controller which can then write it to disk. Mirroring write-back caches across controllers solves this problem and can be designed with minimal effect on cost or performance. With a mirrored cache architecture, I/O's are written to cache memories in multiple controllers before the write operation is acknowledged as complete. If one controller subsequently fails, the surviving controller flushes the contents of the failed controller's cache (which are stored in its cache) safely to disk. Mirrored caches protect data like mirrored disks.

Data Management Features

Disk Mirroring And Management. SAN-attached RAID arrays should

support disk mirroring, all the commonly used RAID levels, online expansion of logical drives, online addition of logical drives and other data management software. Network-wide array management should be available from any client machine on the network.

Bandwidth Scaling Capabilities

Scaleable I/O Performance. SANs require a balanced design. The number (and compute power) of servers attached to a SAN can vary by orders of magnitude and SANs naturally tend to expand over time. However, adding servers to a SAN will result in only marginal performance gains if the SAN-attached RAID arrays lack the horsepower to feed the additional nodes.

Scaleable compute power requires scaleable I/O power. External storage arrays inherently provide scaleable I/O performance since arrays can be incrementally added to a SAN. However, a large number of under-powered or disk channel limited arrays are less cost-effective and more difficult to manage than a smaller number of arrays with performance better matched to the SAN's I/O requirements.

Active-Active Operation. Duplex controllers can operate in active-passive or active-active modes just like cluster nodes. In this context, active-active implies a duplex controller configuration with both controllers simultaneously servicing SAN I/O requests. This is analogous to the active-active operation of cluster nodes.

To realize the full performance potential and total cost-of-ownership (TCO) effectiveness of a SAN, all storage resources must contribute to performance. Controllers that operate in active-passive mode with one controller idle until the other fails are a waste of a valuable SAN resource.

Capacity Scaling Capabilities

Scaleable I/O Capacity. System storage capacity has been increasing 50% per year since the first disk drive was invented. SANs require controllers with surplus back-end channel capacity to accommodate expanding storage needs. Storage controllers that only

support a few disk channels are marginal for SAN applications. Controllers with more back-end channels can not only accommodate more storage, but their arrays can also be configured to provide performance and data availability benefits.

Logical arrays on controllers with two or three disk channels are striped vertically down a channel. Since applications direct most I/O to a single logical array, vertically striping arrays can cause a single I/O processor (IOP) to become a bottleneck (the hot disk phenomena moved into the controller). Horizontal striping balances the I/O load across IOPs.

If an IOP fails, vertically striped arrays on the failed channel become unavailable to the controller with the failed IOP. However, if a RAID 5 array is horizontally striped across channels, then an IOP failure causes the loss of a single disk which RAID 5 algorithms can repair on the fly without disrupting application access to data. This failure mode is identical to a single disk failure in a RAID 5 set.

Host-Based (PCI) RAID Clustering

The implementation philosophy for host-based RAID controllers, is to emulate a SCSI HBA through the Windows NT mini-port driver and controller firmware. The actual physical SCSI devices are not visible to Windows NT/MSCS, but the RAID system devices appear as SCSI devices on a virtual SCSI channel to the system.

Since the disk devices in the shared bus are shared by the RAID controllers in each node, the complication lies in the management of the RAID configuration, failed drive rebuild process and the intra-communication between the two RAID controllers. To maintain the synergy and consistency between the controllers, a communication protocol is established between the shared SCSI channels. Periodic heart beat monitoring and pertinent data exchange, such as RAID logical volume release/reserve and configuration and fault management are done through these channels.

Continued on page 90.

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A Tale Of Two Data Storage Models

By Kevin Honeycutt

The two competing models for using removable media in the enterprise, distributed and centralized, have both seen their proponents' arguments bolstered by new technology advances. It seems certain that for the foreseeable future, both methods for storing, organizing and protecting data will have a legitimate place.

Distributed data protection is the act of putting data storage and recovery at the site of the data. It provides the fastest backup and recovery and it puts control of the data near where it's generated and used. Its limitations have been that it's difficult to make certain that data is protected and it's difficult to make it accessible to other sites. But if you have to rebuild a system, you want the data right there, not across town.

Centralized storage is the act of consolidating data from a number of sources into a single storage resource. It keeps overall costs lower and provides centralized control of the digital assets that organizations are increasingly recognizing as being critical to their overall missions. Detractors point to high entry costs and the slow speed of file recovery and data transfer to and from central sites. But if you have a lot of high-value data, it's natural to want it in one place where you know it's protected.

Less Than Penny Candy

For proponents of the distributed model, both hardware and software advances are making it easier, more effective and secure. Small, automated storage devices — autoloader-class tape libraries — are affordable enough that automated backup and recovery can be easily placed in remote offices. It's common to have a system with automated storage to actually cost less than multiple, manually operated tape drives. New models can bring distributed storage costs down to 0.8 cents/MB — about the same that storage in data center libraries costs. And it can hold a month's worth of data. The new class of autoloaders are compact and easier to use than their predecessors, important for remote sites that don't have full-time trained MIS staff.

On the software side, many of the standard backup and storage management products have greatly increased their remote monitoring and control capabilities. Central consoles can track backup jobs at multiple sites and even redirect jobs over the network to fallback storage. In other words, centralized control of distributed resources.

But the argument's not over. Hardware and networking advances are also making centralized storage easier and more effective too. High installation costs are being overcome by scalable products that allow users to buy capacity as they need it. New tape technologies are improving price/performance. And Fibre Channel is allowing many servers to be backed up easily by single libraries, even over great distances.

Fibre Channel Storage Area Networks (SANs) offer the greatest advantage to arguments for centralized storage, especially centralized backup. Fibre Channel can provide gigabit link speed over distances of up to 10,000 meters before repeaters are needed. So it solves the bandwidth and distance problems traditionally associated with centralized



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storage. More importantly, it offers the unique ability to allow storage devices to be shared easily among multiple sources.

Critically Connected

This capacity is both critically important and not widely understood. With SCSI backup, connections between servers and the tape drives used to back them up are dedicated connections. Multi-hosting, that is, the connection of more than one server to a single tape library, has been supported by several enterprise-class backup software packages. But in a limited way.

If four servers are being backed up, even if they are sharing the same library, each drive in the library is assigned on a permanent basis to one of the servers. If the drive is needed only two hours a day, it remains idle for 22 hours.

Fibre Channel SANs have the technology to change that. Software packages now support dynamic drive allocation that allows multiple servers to share the same drives on a sequential basis. One drive can now be used for 20 hours a day if needed, supporting as many servers as it needs to.

This heavy drive usage is practical now for several reasons. New drive technology has brought an entirely new level of reliability and acceptable duty cycles to tape backup. Twenty hours of usage is not beyond today's drives' capacity. And Fibre Channel builds in redundancy. Because drives can be dynamically reallocated, if a drive does fail, it's easy to complete the backup or recovery with another one. This kind of flexibility is probably more important an advantage for Fibre Channel than the increased bandwidth.

One ADIC customer, for example, started out with backup of three servers on a single, dual-drive Scalar 218 FibreReady tape library (with appropriate host bus adapter and hub). Now the plans are to use one of ADIC's data center Scalar 1000 FibreReady libraries to protect 30 servers.

And finally, for IT departments that want to combine the advantages of the two systems, there's a new combination of hardware and software solutions that makes it possible. *Differencing* backup software (the best example is the new *LiveVault* software

from Network Integrity in Marlborough, Mass.) is becoming available that gives continual data protection by storing bit-by-bit file changes on automated tape libraries. If a user changes one cell in a 3MB spreadsheet, only the bits that represent that cell are updated — not the full 3MB.

The advantage of differencing is that such small amounts of data are transferred that they can easily backup even large servers over low bandwidth networks. This makes remote storage of data from multiple remote sites on a central tape library very practical and without expensive infrastructure upgrades.

What about file restoration? If speed is important, *LiveVault* can send duplicate data to an onsite library so that there are always two copies — one local for fast access, one central for redundancy and control. We have customers planning just such installations, using autoloaders in remote offices with duplicate backup sets stored in a larger, centralized library.

—Kevin Honeycutt is ADIC's Director of Product Management.

Continued from page 86.

To ensure that a central process that administers the intra-communication between the two controllers exists, a Master/Slave control protocol is used.

The Master/Slave description pertains to a two-node cluster. It describes the general protocol that's followed during startup and during normal operation. Even though there is no real concept of Master and Slave as far as the service to the OS is concerned, the Master/Slave is created internal to the RAID controller for configuration management, fault management etc.

Putting the Pieces Together

Affordable SAN topology coupled with RAID-enabled clustered storage strategies are the pieces of a sound, fail-safe architecture that will help bring mainframe reliability and availability into corporate and SOHO x86 server markets. Do not let a single piece of redundancy go to waste.

Downtime costs companies millions of dollars. RAID and clustering technologies will be the insurance to keep your data safe and available.

Fibre Channel and cluster technologies continue to enhance the depth and breadth of the corporate network solution's always increasing availability while maintaining reliability. It's simple: If your data is important enough to the bottom line of your company, RAID technology and clustering technology are the insurance to a safe, reliable and affordable business future.

With the advent of operating system clustering solutions, including the necessary components for PCI hardware-based RAID and external RAID solutions available from every operating system vendor, the cost of server downtime and loss of productivity is a thing of the past. Whether it's SCSI or fibre SAN and clustering connections, the data stored on your disk and the server system it's connected to are fail-safe and ready to go.

— Scott K. Cleland is a Technical Marketing Manager for Mylex Corporation. Portions of this article were culled from white papers written by Kevin Smith and Jin-Lon Hon of Mylex Corporation.



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APPLICATIONS DEVELOPMENT

TurboSFX 3.0

TurboSFX is a suite of wizards and tools that creates Windows 3.1, 95, 98, and NT Self-Extracting EXEcutable (SFX), using step-by-step procedures. It features integrated Wizard for creating delivery packages: Self-extracting EXEcutable, CABinet files with extractor, and CABinet files for HTML-based Internet Component Download (a new package type) distribution.

When creating CABinet files, TurboSFX automatically generates the .inf file with Scan GUID along with editing function. TurboSFX v3.0 also includes functions to run multiple programs before, during and after extraction and take actions depending on the response codes from the 'run program' selection.

Contact Pacific Gold Coast Corp., Locust Valley, NY at (516) 759-3011.

Pentek's SwiftNet 3.4

SwiftNet 3.4 is a bi-directional communications protocol for developing real-time digital signal processing (DSP) applications. New features include: API support for Texas Instruments TMS320C6x and Analog Devices SHARC DSP's; drivers for Texas Instruments GO DSP's Code Composer; extended message size; and drivers for Motorola's PowerPC 2604 VME board and BIT 3/SBS models 466 and 467 S-Bus-to-VME adapters.

Operating systems supported include HP-UX, SunOS, Solaris, Digital UNIX and VxWorks CPU and Pentium processors running Windows 95/NT. SwiftNet supports TI/GODSP Code Composer and TI (Spectron) SPOX software, Texas Instruments C compilers and 3L Parallel C/Diamond libraries.

Contact Pentek, Inc., Upper Saddle River, NJ at (201) 818-5900.

FairCom Database Server

The new FairCom database server includes file encryption. Files that are encrypted using the FairCom Server algorithm can only be decrypted by the

FairCom Server. The FairCom Server SDK allows developers to customize the encryption process so that only the server that has encrypted the data can access it.

The new FairCom Server also includes mirrored file features that can accommodate re-acquisition of a lost mirrored start file. Mirrored files are automatically copied during a rebuild, automatic recovery and dynamic dump restore. FairCom Server supports FreeBSD UNIX, SCO UnixWare and SGI IRIX. It sells for \$445 to \$6,795.

Contact FairCom Corporation, Columbia, MO at (573) 445-6833.

DATA WAREHOUSING

Vista Plus Interface for SAP R/3

The Vista Plus Interface for SAP R/3 is an optional component that integrates Vista Plus enterprise Report-Based Information Management (RBIM) capabilities with SAP R/3 systems. It automatically tracks and updates user and group profiles, folder hierarchies, report tree modifications and security authorizations between the two systems. The integration module uses the native SAP R/3 job scheduler.

Users can launch the Vista Plus Windows client from within the SAP R/3 interface and through the Vista Plus Java client, SAP R/3 report data and documents are available with the same security rights for remote and Internet users.

Contact Quest Software, Inc., Newport Beach, CA at (949) 720-1434.

DESKTOPS AND SERVERS

L700 15.1" Flat Panel Display

Optquest's L700 is a flat panel LCD display with a 15.1" TFT active matrix display with the approximate viewing area of a standard 17" CRT. It produces images at resolutions of up to 1,024x768 and supports true 16.2 million colors. A four-button OSD and OnView controls lets users customize contrast, brightness and more than 15 other settings. ViewMatch control allows users to adjust color temperature and color intensity for screen-to-print color matching.

The display's depth is three inches and it weighs 11.4 pounds. It has a 120-degree horizontal viewing angle and Plug & Play+ auto installation. Estimated street price is \$979.

Contact Optquest, Walnut, CA at (800) 843-6784.

E-COMMERCE

IPNet.Suite 3.0

IPNet.Suite 3.0 marks the first step of IPNet's XML technology. XML support in IPNet.Suite will include: XML-based data import and export for all IPNet products; automated translation between XML and traditional business formats; support for leading ISV XML data type definitions (DTDs); and automated HTML/HTTP Web translation from XML to HTML and other user-presentation formats.

IPNet.Suite 3.0 will support XML for data import and export functions with all IPNet.Suite products, including IP.web.link, IP.customer.link, IP.edi.link and IP.trade.link. XML data elements will be based on existing ANSI X12 standards. The 3.0 release will also support automated identification, scheduling and transmission of XML documents.

Contact IPNet Solutions, Inc., Newport Beach, CA at (888) 882-6600.

MESSAGING AND E-MAIL

Express Assist 2

Express Assist 2 is a utility that lets you backup, copy, move or restore selected Outlook Express e-mail folders, news-group folders and Windows Address Book. It can create compressed backups of key e-mail folders for on-site or off-site storage. The "fast back-up" feature works like a telephone's re-dial button. And its backup reminder system alerts you when it's time to make another backup.

It allows you to choose where to back up to, span diskettes automatically and move e-mail folders between computers. A log is created every time you backup, copy, move or restore your e-mail folders.

Contact Seem Software, Farmingdale, NY at (516) 756-7411.

NETWORK INTEGRATION

UC4 Job Scheduler

UC4 is an NT based multi-platform job scheduler that implements a client/server architecture and allows communication between all computers via TCP/IP. UC4 can interface with most popular mainframe-based job schedulers to provide enterprise-wide job scheduling. It integrates with SAP R/3 and is fully Y2K compliant. UC4 supports UNIX, NT and OS/390 environments running Sybase, Oracle, or Microsoft SQL Server databases.

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PRINTING

Intelliscribe TCP/IP Printing

INTELLIscribe is a TCP/IP print client for Windows 9x that logs error messages and automatically reschedules print jobs if the job does not print. Status information, such as the start and completion time, is also reported. Users may send printer-ready files without launching an application, as well as reprint files without launching the originating application up to a week after the job was initially printed. Advanced printing features allow one or more files to be sent to the printer from one or more directories. Remote users may send print jobs to any TCP/IP addressable printer within a central office or vice versa.

Contact Brooks Internet Software, Idaho Falls, ID at (800) 523-9175.

STORAGE

ATL Products' P3000

ATL Products new P3000 Series Automated DLTape Library has been qualified to operate with HP OpenView OmniBack II 3.0 software in Windows NT and HP-UX environments. OmniBack II's multi-host library sharing enables the P3000 to be shared between multiple, heterogeneous servers, allowing each of the P3000's DLTape drives to be directly

connected to each host. This feature also allows the backup and restore process to run at nearly-SCSI throughput. The new P3000 library is designed to support up to 16 DLTape drives and 326 cartridges for 288 GB per hour performance and 11.4 terabytes.

Contact ATL Products, Irvine, CA at (800) 677-6268.

TrueTriumph MediaServer

The TrueTriumph MediaServer FC series integrates the Synapsys Digital TrueTriumph FC solution with Windows NT server hardware and software. The MediaServer series utilizes high-availability servers, Windows NT Server 4.0 and TrueTriumph FC RAID storage for intranet and Internet services, data warehousing and digital media asset archive. It features up to 16 Pentium II Xeon processors and up to 4.5TB of Fibre Channel storage per system.

The MediaServer 6400 delivers 126MB/sec of Fibre Channel data throughput and can house up to 4.5 terabytes.

Contact Synapsys Digital, LLC, Mountain View, CA at (888) 886-8551.

Gladiator 2550

The Gladiator 2550 RAID data storage system is MTI's first cross-platform, high-availability product designed for Caldera's OpenLinux 2.2 and Windows NT. It can accommodate up to 655GB of data per controller, is compatible with Intel PC86-based servers and supports RAID Levels 0, 1, 0+1 and 5.

Contact MTI Technology, Anaheim, CA at (800) 999-9MTI. ♦



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DATA WAREHOUSING

Certified Data Warehousing (CDW)

The new CDW program from Informix and HP lets customers implement pre-tested and pre-certified enterprise data-warehousing solutions. CDW combines Informix's *Decision Frontier Solution Suite* with HP-UX systems, Windows NT enterprise servers, HP OpenView and Informix's *Enterprise Command Center* for system, network and database management. Included as well is HP's OpenView SMART Plug-In for Informix for administration of both environments from a single console.

NOTEBOOKS

OmniBook XE2

HP's new OmniBook XE2 notebook PC features: a Pentium II 333MHz or 300MHz processor, or Intel Mobile Celeron 333MHz or 266MHz processor; 6.2GB or 4.1GB hard drive; 64MB or 32MB SDRAM, expandable to 256MB; 128-bit graphic controller with 2MB embedded DRAM; 13.3-inch XGA TFT display or 12.1-inch SVGA TFT or HPA display; built-in 24X CD-ROM and floppy-disk drives; built-in 56Kbps V.90 standard compatible modem; and Windows 95/98/NT 4.0, McAfee VirusScan and HP DiagTools 2.0 pre-installed. Expected price is estimated at \$1,600.

url: www.hp.com/omnibook

SAP R/3 MANAGEMENT

OpenView And SAP R/3

As part of its Application Quality of Service strategy, HP has announced several new HP OpenView management solutions for SAP R/3 that include:

OpenView Manager for SAP R/3, which offers end-to-end management of SAP R/3 environments built upon mixed UNIX and Windows NT infrastructures — including SAP R/3 applications and database, servers, desktops, networks, and storage;

OpenView Manager for SAP R/3, NT Edition, which delivers management capabilities for mid market customers with NT-based SAP R/3 environments; and

OpenView SMART Plug-In for SAP R/3 6.0, which provides pre-defined SAP R/3 service views that allow customers to manage SAP R/3 from both an IT and business perspective.

url: www.openview.hp.com

Business Continuity Support (BCS)

HP's BCS is an expansion of its mission-critical support offering for SAP R/3 customers. BCS for SAP provides on-site consultative support that focuses on problem prevention and the continuous improvement of the customer's infrastructure. BCS for SAP complements another new service from HP: mission-critical outsourcing for SAP environments, which provides customers with the highest level of availability for their SAP applications. BCS for SAP is modularized so customers can tailor the service to their individual needs. HP also announced its high-availability clustering solution MC/Service Guard Extension for SAP.

url: www.sap.hp.com/public

STORAGE

New Line Of NAS Servers

Three new HP SureStore CD- and DVD-ROM servers are based on "thin-server" technology and offer one-step setup and installation and remote-management capabilities.

SureStore CD-ROM Server — Allows users to share between one and seven CD-ROMs - \$2,750.

SureStore CD-ROM Server Plus — Includes six CD drives and one 18GB-capacity hard drive and can automatically load data from at least 28 full CD-ROMs onto a large-capacity hard disk - \$4,300.

SureStore CD-/DVD-ROM Server — Each of the seven drives can read CD-ROM and DVD-ROM formats, offering migration path from CD to DVD - \$3,495.

SureStore CD Expansion Tower — A seven-drive CD expansion tower — available for all three models - \$2,350.

New SAN Hardware And Software

HP's new SureStore E SAN hardware and software supports multivendor application server and storage platforms. The new products include: *SureStore E Storage Node Manager*, which discovers, maps and monitors storage devices, fabric devices and server host-bus adapters across a SAN and *SureStore E Switch F16*, a high-bandwidth, 16-port, multiplatform Fibre Channel switch that interconnects all components of a SAN, including the HP SureStore E portfolio and EMC Symmetrix.

HP also introduced the *SureStore E Disk Array MC256*, a high-end open storage subsystem designed to address the demand for Fibre Channel storage area network (SAN)-ready disk arrays for open, highly available, centralized storage. It supports multivendor UNIX system, Windows NT, MPE and mainframe environments and offers multiplatform SAN support with connections to HP-UX, Solaris, AIX and NT.

url: www.enterprisestorage.hp.com

SYSTEM AND NETWORK MANAGEMENT

End-to-End QoS

HP and Cisco Systems, Inc. have teamed to offer an integrated network and server policy-based QoS solution that will protect mission-critical application performance by prioritizing transactions and traffic. The pairing integrates HP WebQoS server-resource optimization and CiscoAssure Policy Networking technologies and allows businesses to exchange QoS information from the server to the network and protect performance of intranet and e-commerce applications.

url: www.hp.com/go/webqos

LAN Analyzer

HP newest line of LAN analyzers range from HP's first software-only analyzer, which runs on a standard notebook computer and has an introductory price of less than \$1,000, to solutions that provide 100%, wire-speed data capture for multilocation 100Mbps Fast Ethernet networks. HP's LAN Analyzer software analyzer is \$995. A fully configured system for full-duplex, wire-speed analysis of 10/100 Mbps Ethernet networks is \$18,995.

url: www.hp.com/go/lananalyzer



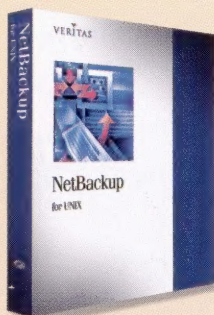
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